SECTION 15130
STAINLESS STEEL PIPING (CERTIFIED) FOR ACTIVATED COOLING WATER SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes: High quality stainless steel piping systems with materials, construction, and inspection requirements that exceed standard industrial practices. It is intended for activated cooling water services.

B. Items denoted as Government Furnished Equipment (GFE) are identified accordingly and as such are not purchased by the contractor. Installation of these components is the responsibility of the contractor installing the piping.

C. Construction activity requirements for cleanliness, quality, and material traceability are higher than normal.

D. Inspection required, especially of welded joints, is extremely high for these systems.

E. This specification is applicable to piping with design pressures of 0 psig through 250 psig and a temperature range of 32ºF to 200ºF.

F. Install this piping system per general requirements of Section 15050 and specific requirements as outlined below.

1.2 RELATED SECTIONS

A. Section 15050, Pipe Systems

B. Section 15074, Identification of Piping Systems.

C. Section 15130, Attachment A, Pressure/Leak Testing Activated Cooling Water Systems

D. Section 15130, Attachment B, Cleaning Requirements - Activated Cooling Water Systems

E. Section 18100A, General Welding Requirements - Target Building and Beam Dump Bldgs

F. Section 15130, Attachment C, Equipment Listing – Activated Cooling Water Systems

G. Section 15130, Attachment D, Data Sheets - Activated Cooling Water Systems

1.3 REFERENCES

A. ANSI B31.3-93, Chemical Plant and Petroleum Refinery Piping.

B. ANSI B18.2.1, Square and Hex Bolts and Screws

C. ANSI B18.2.2, Square and Hex Nuts

D. ASTM A 380-94, Standard Practices for Cleaning and Descaling Stainless Steel Parts, Equipment, and Systems.

E. ASME B16.5A, Dimensional Standards for Steel Pipe Flanges and Flanged Fittings.

F. ASME B16.25 , Buttwelding Ends

G. ASME 36.19M , Stainless Steel Pipe

H. ASME SA 182," Specification for forged or rolled alloy Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High Temperature Service"

I. ASME SA 312," Specification for Seamless and Welded Austenitic Stainless Steel Pipes"

J. ASME A 403," Specification for Wrought Austenitic Stainless Steel Piping Fittings"

K. ASME SA-479, " Specifications for Stainless and Heat Resisting Steel Bars and Shapes for Use in Boilers and Other Pressure Vessels".

L. Federal Standard 183C (FED-STD-183C), Continuous Identification Marking of Iron and Steel Products.

M. ASTM A269, "Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service"

N. MIL-STD-1246C, "Product Cleanness Levels and Contamination Control Program".

1.4 SUBMITTALS

A. Submit for approval a Cleaning Plan based on the requirements set forth in the example plan of Attachment B.

B. Submit for approval certified documentation of proposed Bending Process.

C. Submit for approval fully detailed, certified, fabrication drawings. Shop welds shall be located and identified (numbered) and welder that performed each weld shall be identified.

1.5 QUALITY ASSURANCE

A. Welding shall be in accordance with Division 18, Section 18100A.

PART 2 - PRODUCTS

2.1 MATERIALS

Materials used for construction of section 15130 systems require special controls and documentation. Listed below are the acceptable materials for use in this service. Materials listed GFE (Government Furnished Equipment) will be supplied by Construction Manager (CM). Control and storage requirements for GFE are addressed in Division 1.

The Manufacturer's Certified Test Reports (CMTRs) and the manufacturer's certification of solution anneal at a minimum temperature of 1900 deg F (all completely traceable via heat numbers and material markings) shall be submitted to the CM for approval prior to use of material in fabrication.

Every bolt and nut shall have the proper grade identification mark or insignia.

A. Equipment Data Sheets (Attached)

Data Sheet	Title
106060000-DS-A001-R00	Pressure Safety/Relief Valve (RV-XXX)
106060000-DS-A002-R00	Rupture Discs (RD-XXX)
106060000-DS-A003-R00	Globe Valves – ¾" and smaller (HV-XXX)
106060000-DS-A004-R00	Check Valves – (CV-9XXX)
106060000-DS-A005-R00	Flex Hoses - (FH-9XXX)

B. Equipment Specifications **(GFE)**

106060000-EQ-0001-R00	Fabricated Tanks and Pressure Vessels (Drain Tanks)
106060000-EQ-0002-R00	Bulk Shielding Liner Double-Walled Drain Pipe
106060000-EQ-0003-R00	Globe Valves – Manual, Auto On/Off and Flow Control
106060000-EQ-0004-R00	Fabricated Tanks and Pressure Vessels (Delay Tanks and Gas/Liquid Separator Tanks)
106060000-EQ-0005-R00	Ion Exchange Columns
106060000-EQ-0006-R00	Activated Cooling Water Filters
106060000-EQ-0007-R00	Recirculation Pumps
106060000-EQ-0008-R00	Heat Exchangers
106060000-EQ-0009-R00	Condenser

C. Piping/Tubing Components

Pipe	ASME SA-312	Grade TP 316L, Seamless, Sch 40
Tube	ASTM A-269 Annealed	Grade TP 316L, Seamless Cold Drawn and
Flanges	ASME SA -182	Grade F 316L, raised-face, weldneck, spiral Serrated face with 125-250 micro-inch RMS finish
Bolts	ASME SA -193	Class 2, Grade B8, Strain Hardened
Nuts	ASME SA -194	Grade 8F, Strain Hardened
Plate	ASME SA -240	Type 316L
Bars and Forged Billets	ASME SA- 479	Type 316L
Weld Electrodes	See Specification 18100	
Fittings	ASME SA- 403	Grade WP-S Type 316L
Gaskets	Flexitallic 304 stainless steel, carbon graphite filled spiral wound metal gasket; Flexitallic, Model No. CGI, or equal as a minimum, with inner ring I.D. equal to pipe I.D. for all flanged joints.	

2.2 FABRICATION

A. Maintain identification on pipe, bar and plate materials during fabrication for traceability. Transfer pipe, bar and plate markings, Purchase Order number, and heat number by electro-etching onto pipe, bar or plate to be cut prior to cutting to ensure traceability.

B. Maintain materials in clean condition throughout fabrication process to preclude large scale recleaning of materials. Perform additional cleaning required as part of fabrication process.

C. Exercise controls during fabrication of stainless steel equipment to minimize exposure of metal to contaminants, particularly halides that cause stress-corrosion cracking and pitting corrosion. If halide-bearing compounds are used, remove them by cleaning equipment after fabrication.

D. Solid compounds or markers that contact stainless steel surfaces shall contain no more than 250 PPM of weight of halides and shall not be water-soluble.

E. Bending
1. Bending should not be required except as indicated on drawings.
2. Make bends per flattening and thinning requirements of ANSI B31.3.
3. Use cold bending process only.

F. Cutting/Grinding
1. Cut pipe by sawing, shearing, machining, plasma cutting, or grinding.
2. Grind cut edges that are not to be welded to eliminate shear cracks and gouges and to produce a clean, bright surface.
3. Overlay pipe and sheet ends identified on drawings with weld material to cover exposed end grain of metal for corrosion-resistance purposes.
4. All wire brushes shall be made of stainless steel. Grinding wheels shall be new or previously used only on stainless steel. Localized rust or stain spots resulting from high-speed brushing shall be cleaned using hand brushing. All wire brushes and grinding wheels for use on stainless steel shall be uniquely identified.

G. Bolted Joints
1. All bolts on specification 15130 flanges shall be torqued, using a calibrated torque wrench, in accordance with the requirements of ANSI B31.3. The Subcontractor shall submit a bolting procedure to the CM for approval prior to fabrication. Torquing shall be accomplished in incremental steps using a pattern of tightening which does not distort the flanges.

H. Welding: Perform welding in accordance with Sect. 18100A and as follows:
1. Reclean surfaces to be welded per 3.4.
2. Use GTAW process with argon backing to weld piping. Use an oxygen analyzer to ensure that less than 1 % oxygen is in purge. Back purge is required to 3/16-in. thickness minimum.
3. Do not use welding backing rings, strips, or consumable inserts.
4. Create and maintain pipe weld map(s) to accurately locate and identify each pipe system weld and record symbol of welder. Use a unique weld identification number on weld map to correspond to radiographic record(s) for that weld. The weld map and associated weld reports shall be submitted by the Subcontractor to the CM prior to delivery of the piping systems.
5. All spec. 15130 flanges are to be welded in place while bolted to the mating flange with a 1/8” thick stainless steel plate in place of the flange gasket.

2.3 SOURCE QUALITY CONTROL

A. Bending Process Certification

B. Base bending process certification data on a minimum of three sample bends of each pipe size bend made by each piece of production equipment.

C. Inspect sample bends with liquid penetrant for cracking.

D. Section and measure sample bends to demonstrate compliance with ANSI B31.3.

2.4 FITTINGS

A. Pipe fittings for systems designed under this specification shall be constructed in accordance with the following standard:
   1. Elbows and Reducers – Fittings shall conform to the requirements set forth in ASME A-403 "Specification for Wrought Austenitic Stainless Steel Piping Fittings"

2.5 VALVES

A. Globe Valves ¾" and smaller (See equipment specification 10606000 – EQ000X for globe valves larger than ¾")
   1. Globe valves shall conform to the requirements set forth in the attached data sheet DS-15130X
   2. Globe valve installation shall be in accordance with the requirements set forth in 15100.

B. Check Valves
   1. Check valves shall conform to the requirements set forth in the attached data sheet DS-15130X
   2. Check valve installation shall be in accordance with the requirements set forth in section.

C. Relief Valves/Rupture Disks
   1. Relief valves and Rupture Disks shall conform to the requirements set forth in the attached data sheet DS-15130X and DS-15130XX
   2. Relief valve and Rupture Disk installation shall be in accordance with the requirements set forth in section 15100.

2.6 FLEX HOSES

A. Flex Hoses shall conform to the requirements set forth in the attached data sheet DS-15130X

B. Flex Hose installation shall be in accordance with the requirements set forth in section 3.1 of this specification

PART 3 - EXECUTION

3.1 INSTALLATION

A. The activated cooling water piping will be installed under the supervision of the CM in addition to the minimum requirements specified in the construction specification. Installation shall be in accordance with ANSI B31.3 and general requirements set forth in Sect. 15050.

B. Identification shall be maintained on all materials during fabrication and installation for traceability. Material markings, IR number, and heat number shall be transferred by electro-etching onto any length of material to be cut prior to cutting to ensure traceability.

C. Contamination Control

1. General

All piping material will be delivered by the Subcontractor in a clean condition and sealed for protection from contamination. The Subcontractor shall maintain the pipe in the clean condition throughout the installation process to preclude large scale recleaning of the materials. The Subcontractor shall be responsible for any additional cleaning required as part of the installation process.

Controls shall be exercised during all stages of stainless steel equipment installation to prevent exposure of the metal to contaminants, particularly halides. The Subcontractor shall handle and perform work on stainless steel in accordance with ASTM A-380 to minimize the potential for iron contamination. Any solid compounds or markers that contract the stainless steel surfaces of the equipment shall be low-halide type (< 250 micro-grams/gram) and shall be free of water -soluble halides. Any lubricants to be used in the pipe end prep process shall be free of water–soluble halides (< 50 micro-grams/gram) and shall be approved by the CM prior to the start of fabrication.

3.2 REPAIR/RESTORATION

A. Repair defective welds in accordance with Div 18100A. Inspect and re-examine repaired welds. Defective material shall not be repaired by welding.

3.3 FIELD QUALITY CONTROL – TESTING & EXAMINATION

A. Pressure/Leak Test: Test piping in accordance with Attachment A.

B. Bends: Examine bends in pipe and tubing per 100% liquid-penetrant examination requirements of Section 18100A.

C. Welds: Examine Welds in pipe and tubing per Sect. 18100A.

3.4 PRE-CLEANING

A. Clean Type 316L stainless steel in a manner that does not introduce halides to pipe surface (inside of outside) and which provides a clean interior surface, free of oils, cutting fluids, nitrides, oxides, carbides, dirt, dust, and moisture. Only demineralized or distilled water with resistively greater than 1.5 Mohm-cm, denatured ethyl alcohol or other CM approved solvent may be used.

B. Clean stainless steel piping materials prior to welding operations and after cutting of pipe.

C. Reclean piping materials prior to welding if an intermediate operation is performed after cleaning, including cutting, grinding, pervious welds, or other operations in which seal is removed and pipe interior is contaminated.

D. Hand wipe exterior and interior surfaces 1 in. back from weld face with solvent-wetted cloths. Change cloths frequently. Stop wiping when cloth remains clean.

E. Use lint-free cloth swabs to dry pipe, fittings, and valves. Change swabs frequently. Stop

drying when swabs come out clean and dry.

F. Use hand brushing to clean localized rust or stain spots resulting from high-speed brushing.

G. Follow the cleaning procedures and guidelines identified in specification section 15130 Attachment B

3.5 TESTING AND EXAMINATION

A. Pressure/Leak Testing: Test piping systems in accordance with Attachment A.

B. Welds

See Division 18 for weld examination requirements.

3.6 SPECIAL REQUIREMENTS FOR TANK VAULT PIPING

A. The following recommended method or an alternative approved by the CM shall be used to leak test the piping connected to all tanks.

B. Plug one pipe end at the tank nozzle. Close the valve nearest the tank for the pipe being tested. Test the pipe in accordance with Section 3.5.

END OF SECTION 15130

ATTACHMENT A

PRESSURE AND LEAK TESTING

(NOT TO BE INCLUDED WITH THE 75% ISSUE)

ATTACHMENT B

CLEANING PROCEDURES

(SYSTEM CLEANING IS NOT INCLUDED AS PART OF THE 75% ISSUE)

ATTACHMENT C

EQUIPMENT LISTING

1.1 SNS Activated Water Loops Equipment List

2Vessels

SEP-1020	Mercury Exchanger Cooling Loop Gas/Liquid Separator
SEP-1500	Target Shroud/Proton Beam Window Cooling Loop Gas/Liquid Separator
SEP-2000	Moderators/Shutters/Inserts Cooling Loop Gas/Liquid Separator
SEP-2500	Reflector Plugs Cooling Loop Gas/Liquid Separator
SEP-9300	Ring Injection Beam Stop Cooling Loop Gas/Liquid Separator
TK-1030	Mercury Exchanger Cooling Loop Drain Tank
TK-1510	Target Shroud/Proton Beam Window Cooling Loop Drain Tank
TK-1511	Target Shroud Cooling Loop Delay Tank
TK-1512	Proton Beam Window Cooling Loop Delay Tank
TK-2010	Moderators/Shutters/Inserts Cooling Loop Drain Tank
TK-2011	Moderators/Shutters/Inserts Cooling Loop Delay Tank
TK-2510	Reflector Plugs Cooling Loop Drain Tank
TK-2511	Reflector Plugs Cooling Loop Delay Tank
TK-9310	Ring Injection Beam Stop Cooling Loop Drain Tank
TK-9311	Ring Injection Beam Stop Cooling Loop Delay Tank

3Heat Exchangers

HX-1050	Mercury Exchanger Cooling Loop Cooler
HX-1530	Target Shroud/Proton Beam Window Cooling Loop Cooler
HX-1531	Target Shroud/Proton Beam Window Offgas Water Condenser
HX-2041	Moderators/Shutters/Inserts Cooling Loop Cooler
HX-2541	Reflector Plugs Cooling Loop Cooler
HX-2542	Reflector Plugs Offgas Water Condenser
HX-9320	Ring Injection Beam Stop Cooling Loop Cooler
HX-9321	Ring Injection Beam Stop Offgas Water Condenser
EHTR-2040	Moderators/Shutters/Inserts Cooling Loop Trim Heater

4Pumps

P-1000A	Mercury Exchanger Cooling Loop Pump
P-1000B	Mercury Exchanger Cooling Loop Pump
P-1520A	Target Shroud/Proton Beam Window Cooling Loop Pump
P-1520B	Target Shroud/Proton Beam Window Cooling Loop Pump
P-2030A	Moderators/Shutters/Inserts Cooling Loop Pump
P-2030B	Moderators/Shutters/Inserts Cooling Loop Pump
P-2530A	Reflector Plugs Cooling Loop Pump
P-2530B	Reflector Plugs Cooling Loop Pump
P-9330A	Ring Injection Beam Stop Cooling Loop Pump
P-9330B	Ring Injection Beam Stop Cooling Loop Pump
P-2532	Reflector Plugs Cooling Loop Heavy Water Makeup Drum Pump

5 Ion Exchange Columns	
IX-1040A	Mercury Exchanger Cooling Loop Ion Exchange Column
IX-1040B	Mercury Exchanger Cooling Loop Ion Exchange Column
IX-1550A	Target Shroud/Proton Beam Window Cooling Loop Ion Exchange Column
IX-1550B	Target Shroud/Proton Beam Window Cooling Loop Ion Exchange Column
IX-2020A	Moderators/Shutters/Inserts Cooling Loop Ion Exchange Column
IX-2020B	Moderators/Shutters/Inserts Cooling Loop Ion Exchange Column
IX-2560A	Reflector Plugs Cooling Loop Ion Exchange Column
IX-2560B	Reflector Plugs Cooling Loop Ion Exchange Column
IX-9350A	Ring Injection Beam Stop Cooling Loop Ion Exchange Column
IX-9350B	Ring Injection Beam Stop Cooling Loop Ion Exchange Column
6 Filters	
FLT-1010	Mercury Exchanger Cooling Loop Pre-filter
FLT-1011	Mercury Exchanger Cooling Loop After-filter
FLT-1540	Target Shroud/Proton Beam Window Cooling Loop Pre-filter
FLT-1541	Target Shroud/Proton Beam Window Cooling Loop After-filter
FLT-2050	Moderators/Shutters/Inserts Cooling Loop Pre-filter
FLT-2051	Moderators/Shutters/Inserts Cooling Loop After-filter
FLT-2520	Reflector Plugs Cooling Loop Pre-filter
FLT-2521	Reflector Plugs Cooling Loop After-filter
FLT-9340	Ring Injection Beam Stop Cooling Loop Pre-filter
FLT-9341	Ring Injection Beam Stop Cooling Loop After-filter
7 Samplers	
	Mercury Exchanger Cooling Loop Sample Panel
	Target Shroud/Proton Beam Window Cooling Loop Sample Panel
	Moderators/Shutters/Inserts Cooling Loop Sample Panel
	Reflector Plugs Cooling Loop Sample Panel
	Ring Injection Beam Stop Cooling Loop Sample Panel

Valve Summary Tables-Activated Water Loops (15130)

Table 1 Manual Valves

Size	¾"	1"	1-1/2"		2"		3"	4"	6"
Valve Tag Number	HV-2097	HV-1034	HV-1039	HV-2172	HV-1010	HV-2510	HV-1511	HV-1004	HV-1006
	HV-2098	HV-1035	HV-1044	HV-2173	HV-1011	HV-2511	HV-1512	HV-1005	HV-1007
	HV-2099	HV-1038	HV-1515	HV-2174	HV-1012	HV-2512	HV-2155	HV-2504	HV-2550
	HV-2100	HV-1045	HV-1516	HV-2175	HV-1013	HV-2513	HV-2156		HV-2551
	HV-2101	HV-1081	HV-1517	HV-2176	HV-1016	HV-2514	HV-2505		
	HV-2102	HV-1082	HV-1518	HV-2177	HV-1017	HV-2515	HV-2506		
	HV-2103	HV-1083	HV-1519	HV-2178	HV-1018	HV-2554	HV-9304		
	HV-2104	HV-1099	HV-1520	HV-2179	HV-1019	HV-2555	HV-9307		
	HV-2105	HV-1100	HV-1521	HV-2180	HV-1020	HV-2556	HV-9309		
	HV-2106	HV-1101	HV-1522	HV-2181	HV-1021	HV-2559	HV-9310		
	HV-2107	HV-1278	HV-1523	HV-2183	HV-1022	HV-2560			
	HV-2108	HV-1545	HV-1524	HV-2202	HV-1023	HV-2561			
	HV-2109	HV-1594	HV-1525	HV-2507	HV-1024	HV-2562			
	HV-2110	HV-1595	HV-1526	HV-2508	HV-1025	HV-2563			
	HV-2111	HV-1596	HV-1527	HV-2509	HV-1026	HV-2564			
	HV-2112	HV-1597	HV-1528	HV-2594	HV-1027	HV-2565			
	HV-2113	HV-1800	HV-1529	HV-9313	HV-1028	HV-2566			
	HV-2114	HV-1810	HV-1530	HV-9314	HV-1029	HV-2567			
	HV-2132	HV-1816	HV-1531	HV-9315	HV-1030	HV-2568			
	HV-2133	HV-1817	HV-1532	HV-9316	HV-1031	HV-2569			
	HV-2134	HV-2162	HV-1533	HV-9319	HV-1032	HV-2570			
	HV-2135	HV-2163	HV-1534	HV-9320	HV-1033	HV-2571			
	HV-2136	HV-2203	HV-1535	HV-9321	HV-1037	HV-2572			
	HV-2137	HV-2279	HV-1536	HV-9322	HV-1504	HV-2573			
	HV-2138	HV-2280	HV-1544	HV-9323	HV-1507	HV-2574			
	HV-2139	HV-2281	HV-2004	HV-9324	HV-1508	HV-2575			
	HV-2140	HV-2282	HV-2005	HV-9325	HV-1537	HV-2576			
	HV-2141	HV-2302	HV-2006	HV-9326	HV-1538	HV-2577			
	HV-2142	HV-2586	HV-2159	HV-9327	HV-1539	HV-2578			
	HV-2143	HV-2588	HV-2160	HV-9328	HV-2195	HV-2579			
	HV-2144	HV-2589	HV-2161	HV-9329	HV-2196	HV-2580			
	HV-2145	HV-2599	HV-2164	HV-9330	HV-2197	HV-2585			
	HV-2146	HV-2623	HV-2165	HV-9331	HV-2287				
	HV-2147	HV-2624	HV-2166	HV-9332					
	HV-2148	HV-2625	HV-2167	HV-9333					
	HV-2149	HV-2626	HV-2168	HV-9334					
	HV-2150	HV-2901	HV-2169	HV-9335					
	FCV-2115	HV-9305	HV-2170	HV-9336					
	FCV-2116	HV-9306	HV-2171	HV-9343					
	FCV-2117	HV-9337							
	FCV-2118	HV-9338							
	FCV-2119	HV-9339							
	FCV-2120	HV-9378							
	FCV-2121	HV-9379							
	FCV-2122	HV-9380							
	FCV-2123	HV-9381							
	FCV-2124	HV-9386							
	FCV-2125	HV-9387							
	FCV-2126	HV-9579							
	FCV-2127	HV-9589							
	FCV-2128								
	FCV-2129								
	FCV-2130								
	FCV-2131								
	FCV-2132								
Quantity	55	50	78		65		10	3	4

Table 2 Remotely Operated Manual Valves

Size	1”	1-1/2”	2”	3”	4”
Valve Tag Number	XV-9306	XV-2528	XV-1506 XV-1510	XV-2525 XV-2527 XV-9307	XV-2526
Quantity	1	1	2	3	1

Table 3 Control Valves

Size	1”	Fail	1-1/2”	Fail	2”	Fail	3”	Fail	6”	Fail
Valve Tag Number	HCV-9342 HCV-1544	Last Last	HCV-1543 HCV-2041 HCV-2043 HCV-2044 HCV-2541 HCV-2542C HCV-2542D HCV-9343	Last Last Last Last Last Last Last Last	HCV-1043 HCV-1541 HCV-1542 HCV-2542A HCV-2542B HCV-2543A HCV-2543B HCV-2543C HCV-2543D HCV-2544	Last Last Last Last Last Last Last Last Last Last	HCV-9341	Last	HCV-1041	Last
Quantity	2		8		10		1		1	

Table 4 Actuated Shutoff Valves

Size	1”	Fail	1-1/2”	Fail	2”	Fail	3”	Fail	6”	Fail
Valve Tag Number	SV-1041 SV-1271 SV-1272 SV-1273 SV-9571 SV-9572 SV-9573	Close Open Open Open Open Open Open	SV-1040 SV-1541 SV-1774 SV-1775 SV-1776 SV-1777 SV-1778 SV-1779 SV-2199 SV-2276 SV-2277 SV-2598 SV-2779 SV-2900 SV-9377 SV-9574 SV-9575 SV-9577 SV-9578	Close Close Close Close Close Close Close Close Close Close Close Close Close Open Close Close Close Close Close	SV-1771 SV-1772 SV-1773 SV-2001 SV-2003 SV-2157 SV-2158 SV-2271 SV-2272 SV-2273 SV-2274 SV-2275 SV-2278 SV-2300 SV-2301 SV-2582 SV-2773 SV-2774 SV-2775 SV-2776 SV-2777 SV-2778	Open Open Open Open Open Open Open Close Close Close Close Close Close Open Open Close Open Open Open Close Close Close	SV-1501 SV-1503 SV-1513 SV-1514 SV-1780 SV-9301 SV-9303 SV-9311 SV-9312 SV-9576	Open Open Open Open Close Open Open Open Open Close	SV-1003 SV-1008 SV-1009 SV-1042 SV-2501 SV-2503 SV-2552 SV-2553 SV-2782	Open Open Open Open Open Open Open Open Close
Quantity	7		19		22		10		9	

Table 5 Check Valves

Size	1”	1-1/2”	2”	3”	4”
Valve Tag Number	CKV-1036 CKV-2597 CKV-9340	CKV-1043 CKV-1543 CKV-2201 CKV-9342	CKV-1505 CKV-1540 CKV-2000 CKV-2002 CKV-2198 CKV-2581 CKV-2584	CKV-1500 CKV-1502 CKV-1509 CKV-2154 CKV-9300 CKV-9302 CKV-9308	CKV-1000 CKV-1002 CKV-2500 CKV-2502 CKV-2549
Quantity	3	4	7	7	5

Table 6 Instrumentation Valves (Partial List)

Size	½”				
Valve Tag Number	HV-1084 HV-1085 HV-1284 HV-1285 HV-1286 HV-1287 HV-1288 HV-1289 HV-1290 HV-1291 HV-1598	HV-1599 HV-1812 HV-1813 HV-1814 HV-1815 HV-1818 HV-1819 HV-1820 HV-1821 HV-2283 HV-2284	HV-2308 HV-2309 HV-2310 HV-2311 HV-2312 HV-2313 HV-2314 HV-2315 HV-2627 HV-2628 HV-2914	HV-2915 HV-2916 HV-2917 HV-2922 HV-2923 HV-2924 HV-2925 HV-9353 HV-9373 HV-9382 HV-9383	HV-9584 HV-9590 HV-9591 HV-9592 HV-9593 HV-9596 HV-9597 HV-9598 HV-9599
Quantity	53				

ATTACHMENT D

EQUIPMENT DATA SHEETS

RELIEF VALVE DATA SHEET

Tag No.: RV-1300 Mercury Exchanger Feed	A. **Quantity Required: ONE**
Applicable Code: ASME Section VIII Division 1	
Type	☐ **Safety** ☐ **Relief** ☒ **Safety Relief**
	☐ **Conventional** ☒ **Balanced Bellows** ☐ **Pilot Operated**
Connections	☒ **Flanged** ☐ **Screwed**
	Flange Rating: 150 Flange Facing: Raised Face 125-250 Ra
	Line Size: Inlet/Outlet / inches

DESIGN CONDITIONS

Set Pressure: **HOLD** PSIG	Max Operating Pressure HOLD PSIG
Temperature, ^{o}F: Operating 87 Flowing 87	Vacuum Conditions Inlet/Outlet: /
Static Back Pressure: **HOLD** PSIG	Built-up Back Pressure: **HOLD** PSIG
Vessel MAWP: 150 PSIG	Allowable Overpressure: 10%
Service: ☒ Static ☐ Cyclic ☐ Pulsating	Installed Downstream of Rupture Disc: ☐Yes ☒No
Fluid: Water ☐ Gas ☒ Liquid	MW: 18.0152 C_p/C_v: 1.329
Capacity Required: 200,000 lb/hr	Density: 62.15 lb/ft^3 Viscosity: 0.788 cP
Orifice: Calculated Area, in^2: Selected Area, in^2: Orifice Designation:	
Design Basis: Blocked Flow	

ATTACHMENTS / ACCESSORIES

Cap: ☒ Screwed ☐ Bolted	Lever: ☐ Plain ☐ Packed
7.2 ☐ **Test Gag** ☐ **Field Test Connection** ☐ **Pilot Filter**	
☐ Jacket ☐ Bolt-on ☐ Integral Jacket Fluid: Design P: PSIG Design T: ^{o}F	

MATERIALS OF CONSTRUCTION

Body: 316 SS	**Bonnet:** 316 SS
Nozzle: 316 SS	**Disc:** 316 SS
Guide: 316 SS	**Bellows:** 316 SS
Resilient Seats:	**Spring:** 316 SS
Gaskets:	**Flanges:** 316 SS

DOCUMENTATION

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Code Certificate of Compliance			2
NOTES:			

RELIEF VALVE DATA SHEET

Tag No.: RV-1500 Target Shroud Feed	A. **Quantity Required: ONE**
Applicable Code: ASME Section VIII Division 1	
Type	☐ **Safety** ☐ **Relief** ☒ **Safety Relief**
	☐ **Conventional** ☒ **Balanced Bellows** ☐ **Pilot Operated**
Connections	☒ **Flanged** ☐ **Screwed**
	Flange Rating: 150 Flange Facing: Raised Face 125-250 Ra
	Line Size: Inlet/Outlet / inches

DESIGN CONDITIONS

Set Pressure: **HOLD** PSIG	Max Operating Pressure HOLD PSIG
Temperature, ^{o}F: Operating 92 Flowing 92	Vacuum Conditions Inlet/Outlet: /
Static Back Pressure: **HOLD** PSIG	Built-up Back Pressure: **HOLD** PSIG
Vessel MAWP: 52.8 PSIG	Allowable Overpressure: 10%
Service: ☒ Static ☐ Cyclic ☐ Pulsating	Installed Downstream of Rupture Disc: ☐Yes ☒No
Fluid: Water ☐ Gas ☒ Liquid	MW: 18.0152 C_p/C_v: 1.329
Capacity Required: 25,000 lb/hr	Density: 62.09 lb/ft^3 Viscosity: 0.744 cP
Orifice: Calculated Area, in^2: Selected Area, in^2: Orifice Designation:	
Design Basis: Blocked Flow	

ATTACHMENTS / ACCESSORIES

Cap: ☒ Screwed ☐ Bolted	Lever: ☐ Plain ☐ Packed
7.3 ☐ **Test Gag** ☐ **Field Test Connection** ☐ **Pilot Filter**	
☐ Jacket ☐ Bolt-on ☐ Integral Jacket Fluid: Design P: PSIG Design T: ^{o}F	

MATERIALS OF CONSTRUCTION

Body: 316 SS	**Bonnet:** 316 SS
Nozzle: 316 SS	**Disc:** 316 SS
Guide: 316 SS	**Bellows:** 316 SS
Resilient Seats:	**Spring:** 316 SS
Gaskets:	**Flanges:** 316 SS

DOCUMENTATION

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Operating & Maintenance Instructions			2
Installation Instructions			2
Test & Inspection Reports			2
Material Certifications (CMTRs)			2
Code Certificate of Compliance			2
NOTES:			

RELIEF VALVE DATA SHEET

Tag No.: RV-1501 Proton Beam Window Feed	A. **Quantity Required: ONE**
Applicable Code: ASME Section VIII Division 1	
Type	☐ **Safety** ☐ **Relief** ☒ **Safety Relief**
	☐ **Conventional** ☒ **Balanced Bellows** ☐ **Pilot Operated**
Connections	☒ **Flanged** ☐ **Screwed**
	Flange Rating: 150 Flange Facing: Raised Face 125-250 Ra
	Line Size: Inlet/Outlet / inches

DESIGN CONDITIONS

Set Pressure: **HOLD** PSIG	Max Operating Pressure HOLD PSIG
Temperature, ^{o}F: Operating 92 Flowing 92	Vacuum Conditions Inlet/Outlet: /
Static Back Pressure: **HOLD** PSIG	Built-up Back Pressure: **HOLD** PSIG
Vessel MAWP: 75.3 PSIG	Allowable Overpressure: 10%
Service: ☒ Static ☐ Cyclic ☐ Pulsating	Installed Downstream of Rupture Disc: ☐Yes ☒No
Fluid: Water ☐ Gas ☒ Liquid	MW: 18.0152 C_p/C_v: 1.329
Capacity Required: 20,000 lb/hr	Density: 62.09 lb/ft^3 Viscosity: 0.744 cP
Orifice: Calculated Area, in^2: Selected Area, in^2: Orifice Designation:	
Design Basis: Blocked Flow	

ATTACHMENTS / ACCESSORIES

Cap: ☒ Screwed ☐ Bolted	Lever: ☐ Plain ☐ Packed
7.4 ☐ **Test Gag** ☐ **Field Test Connection** ☐ **Pilot Filter**	
☐ Jacket ☐ Bolt-on ☐ Integral Jacket Fluid: Design P: PSIG Design T: ^{o}F	

MATERIALS OF CONSTRUCTION

Body: 316 SS	**Bonnet:** 316 SS
Nozzle: 316 SS	**Disc:** 316 SS
Guide: 316 SS	**Bellows:** 316 SS
Resilient Seats:	**Spring:** 316 SS
Gaskets:	**Flanges:** 316 SS

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Installation Instructions			2
Test & Inspection Reports			2
Material Certifications (CMTRs)			2
Code Certificate of Compliance			2
NOTES:			

RELIEF VALVE DATA SHEET

Tag No.: RV-1502 Proton Beam Window Box Feed	A. **Quantity Required: ONE**
Applicable Code: ASME Section VIII Division 1	
Type	☐ **Safety** ☐ **Relief** ☒ **Safety Relief**
	☐ **Conventional** ☒ **Balanced Bellows** ☐ **Pilot Operated**
Connections	☒ **Flanged** ☐ **Screwed**
	Flange Rating: 150 Flange Facing: Raised Face 125-250 Ra
	Line Size: Inlet/Outlet / inches

DESIGN CONDITIONS

Set Pressure: **HOLD** PSIG	Max Operating Pressure HOLD PSIG
Temperature, ^{o}F: Operating 92 Flowing 92	Vacuum Conditions Inlet/Outlet: /
Static Back Pressure: **HOLD** PSIG	Built-up Back Pressure: **HOLD** PSIG
Vessel MAWP: HOLD PSIG	Allowable Overpressure: 10%
Service: ☒ Static ☐ Cyclic ☐ Pulsating	Installed Downstream of Rupture Disc: ☐Yes ☒No
Fluid: Water ☐ Gas ☒ Liquid	MW: 18.0152 C_p/C_v: 1.329
Capacity Required: 4,830 lb/hr	Density: 62.09 lb/ft^3 Viscosity: 0.744 cP
Orifice: Calculated Area, in^2: Selected Area, in^2: Orifice Designation:	
Design Basis: Blocked Flow	

ATTACHMENTS / ACCESSORIES

Cap: ☒ Screwed ☐ Bolted	Lever: ☐ Plain ☐ Packed
7.5 ☐ **Test Gag** ☐ **Field Test Connection** ☐ **Pilot Filter**	
☐ Jacket ☐ Bolt-on ☐ Integral Jacket Fluid: Design P: PSIG Design T: ^{o}F	

MATERIALS OF CONSTRUCTION

Body: 316 SS	**Bonnet:** 316 SS
Nozzle: 316 SS	**Disc:** 316 SS
Guide: 316 SS	**Bellows:** 316 SS
Resilient Seats:	**Spring:** 316 SS
Gaskets:	**Flanges:** 316 SS

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Material Certifications (CMTRs)			2
Code Certificate of Compliance			2
NOTES:			

RELIEF VALVE DATA SHEET

Tag No.: RV-2000 Moderators Top Cryogenic Feed	A. **Quantity Required: ONE**
Applicable Code: ASME Section VIII Division 1	
Type	☐ **Safety** ☐ **Relief** ☒ **Safety Relief**
	☐ **Conventional** ☒ **Balanced Bellows** ☐ **Pilot Operated**
Connections	☒ **Flanged** ☐ **Screwed**
	Flange Rating: 150 Flange Facing: Raised Face 125-250 Ra
	Line Size: Inlet/Outlet / inches

DESIGN CONDITIONS

Set Pressure: **HOLD** PSIG	Max Operating Pressure HOLD PSIG
Temperature, ^{o}F: Operating 80 Flowing 80	Vacuum Conditions Inlet/Outlet: /
Static Back Pressure: **HOLD** PSIG	Built-up Back Pressure: **HOLD** PSIG
Vessel MAWP: 57.8 PSIG	Allowable Overpressure: 10%
Service: ☒ Static ☐ Cyclic ☐ Pulsating	Installed Downstream of Rupture Disc: ☐Yes ☒No
Fluid: Water ☐ Gas ☒ Liquid	MW: 18.0152 C_p/C_v: 1.329
Capacity Required: 7,925 lb/hr	Density: 62.22 lb/ft^3 Viscosity: 0.858 cP
Orifice: Calculated Area, in^2: Selected Area, in^2: Orifice Designation:	
Design Basis: Blocked Flow	

ATTACHMENTS / ACCESSORIES

Cap: ☒ Screwed ☐ Bolted	Lever: ☐ Plain ☐ Packed
7.6 ☐ **Test Gag** ☐ **Field Test Connection** ☐ **Pilot Filter**	
☐ Jacket ☐ Bolt-on ☐ Integral Jacket Fluid: Design P: PSIG Design T: ^{o}F	

MATERIALS OF CONSTRUCTION

Body: 316 SS	**Bonnet:** 316 SS
Nozzle: 316 SS	**Disc:** 316 SS
Guide: 316 SS	**Bellows:** 316 SS
Resilient Seats:	**Spring:** 316 SS
Gaskets:	**Flanges:** 316 SS

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NOTES:			

RELIEF VALVE DATA SHEET

Tag No.: RV-2001 Moderators Ambient Feed	A. **Quantity Required: ONE**
Applicable Code: ASME Section VIII Division 1	
Type	☐ **Safety** ☐ **Relief** ☒ **Safety Relief**
	☐ **Conventional** ☒ **Balanced Bellows** ☐ **Pilot Operated**
Connections	☒ **Flanged** ☐ **Screwed**
	Flange Rating: 150 Flange Facing: Raised Face 125-250 Ra
	Line Size: Inlet/Outlet / inches

DESIGN CONDITIONS

Set Pressure: **HOLD** PSIG	Max Operating Pressure HOLD PSIG
Temperature, ^{o}F: Operating 82 Flowing 82	Vacuum Conditions Inlet/Outlet: /
Static Back Pressure: **HOLD** PSIG	Built-up Back Pressure: **HOLD** PSIG
Vessel MAWP: 57.8 PSIG	Allowable Overpressure: 10%
Service: ☒ Static ☐ Cyclic ☐ Pulsating	Installed Downstream of Rupture Disc: ☐Yes ☒No
Fluid: Water ☐ Gas ☒ Liquid	MW: 18.0152 C_p/C_v: 1.329
Capacity Required: 7,925 lb/hr	Density: 62.20 lb/ft^3 Viscosity: 0.837 cP
Orifice: Calculated Area, in^2: Selected Area, in^2: Orifice Designation:	
Design Basis: Blocked Flow	

ATTACHMENTS / ACCESSORIES

Cap: ☒ Screwed ☐ Bolted	Lever: ☐ Plain ☐ Packed
7.7 ☐ **Test Gag** ☐ **Field Test Connection** ☐ **Pilot Filter**	
☐ Jacket ☐ Bolt-on ☐ Integral Jacket Fluid: Design P: PSIG Design T: ^{o}F	

MATERIALS OF CONSTRUCTION

Body: 316 SS	**Bonnet:** 316 SS
Nozzle: 316 SS	**Disc:** 316 SS
Guide: 316 SS	**Bellows:** 316 SS
Resilient Seats:	**Spring:** 316 SS
Gaskets:	**Flanges:** 316 SS

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Code Certificate of Compliance			2
NOTES:			

RELIEF VALVE DATA SHEET

Tag No.: RV-2500A Reflector Plugs Vessel Wall Feed	A. **Quantity Required: ONE**
Applicable Code: ASME Section VIII Division 1	
Type	☐ **Safety** ☐ **Relief** ☒ **Safety Relief**
	☐ **Conventional** ☒ **Balanced Bellows** ☐ **Pilot Operated**
Connections	☒ **Flanged** ☐ **Screwed**
	Flange Rating: 150 Flange Facing: Raised Face 125-250 Ra
	Line Size: Inlet/Outlet / inches

DESIGN CONDITIONS

Set Pressure: **HOLD** PSIG	Max Operating Pressure HOLD PSIG
Temperature, ^{o}F: Operating 92 Flowing 92	Vacuum Conditions Inlet/Outlet: /
Static Back Pressure: **HOLD** PSIG	Built-up Back Pressure: **HOLD** PSIG
Vessel MAWP: 55.3 PSIG	Allowable Overpressure: 10%
Service: ☒ Static ☐ Cyclic ☐ Pulsating	Installed Downstream of Rupture Disc: ☐Yes ☒No
Fluid: Heavy Water ☐ Gas ☒ Liquid	MW: 20.03152 C_p/C_v: 1.32
Capacity Required: 7,405 lb/hr	Density: 68.89 lb/ft^3 Viscosity: 0.896 cP
Orifice: Calculated Area, in^2: Selected Area, in^2: Orifice Designation:	
Design Basis: Blocked Flow	

ATTACHMENTS / ACCESSORIES

Cap: ☒ Screwed ☐ Bolted	Lever: ☐ Plain ☐ Packed
7.8 ☐ **Test Gag** ☐ **Field Test Connection** ☐ **Pilot Filter**	
☐ Jacket ☐ Bolt-on ☐ Integral Jacket Fluid: Design P: PSIG Design T: ^{o}F	

MATERIALS OF CONSTRUCTION

Body: 316 SS	**Bonnet:** 316 SS
Nozzle: 316 SS	**Disc:** 316 SS
Guide: 316 SS	**Bellows:** 316 SS
Resilient Seats:	**Spring:** 316 SS
Gaskets:	**Flanges:** 316 SS

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Material Certifications (CMTRs)			2
Code Certificate of Compliance			2
NOTES:			

RELIEF VALVE DATA SHEET

Tag No.: RV-2500B Reflector Plugs Lower Outer Plug Feed	A. **Quantity Required: ONE**
Applicable Code: ASME Section VIII Division 1	
Type	☐ **Safety** ☐ **Relief** ☒ **Safety Relief**
	☐ **Conventional** ☒ **Balanced Bellows** ☐ **Pilot Operated**
Connections	☒ **Flanged** ☐ **Screwed**
	Flange Rating: 150 Flange Facing: Raised Face 125-250 Ra
	Line Size: Inlet/Outlet / inches

DESIGN CONDITIONS

Set Pressure: **HOLD** PSIG	Max Operating Pressure HOLD PSIG
Temperature, ^{o}F: Operating 92 Flowing 92	Vacuum Conditions Inlet/Outlet: /
Static Back Pressure: **HOLD** PSIG	Built-up Back Pressure: **HOLD** PSIG
Vessel MAWP: 55.3 PSIG	Allowable Overpressure: 10%
Service: ☒ Static ☐ Cyclic ☐ Pulsating	Installed Downstream of Rupture Disc: ☐Yes ☒No
Fluid: Heavy Water ☐ Gas ☒ Liquid	MW: 20.03152 C_p/C_v: 1.32
Capacity Required: HOLD lb/hr	Density: 68.89 lb/ft^3 Viscosity: 0.896 cP
Orifice: Calculated Area, in^2: Selected Area, in^2: Orifice Designation:	
Design Basis: Blocked Flow	

ATTACHMENTS / ACCESSORIES

Cap: ☒ Screwed ☐ Bolted	Lever: ☐ Plain ☐ Packed
7.9 ☐ **Test Gag** ☐ **Field Test Connection** ☐ **Pilot Filter**	
☐ Jacket ☐ Bolt-on ☐ Integral Jacket Fluid: Design P: PSIG Design T: ^{o}F	

MATERIALS OF CONSTRUCTION

Body: 316 SS	**Bonnet:** 316 SS
Nozzle: 316 SS	**Disc:** 316 SS
Guide: 316 SS	**Bellows:** 316 SS
Resilient Seats:	**Spring:** 316 SS
Gaskets:	**Flanges:** 316 SS

DOCUMENTATION

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Material Certifications (CMTRs)			2
Code Certificate of Compliance			2
NOTES:			

RELIEF VALVE DATA SHEET

Tag No.: RV-2500C Reflector Plugs Lower Outer Plug Feed	A. **Quantity Required: ONE**
Applicable Code: ASME Section VIII Division 1	
Type	☐ **Safety** ☐ **Relief** ☒ **Safety Relief**
	☐ **Conventional** ☒ **Balanced Bellows** ☐ **Pilot Operated**
Connections	☒ **Flanged** ☐ **Screwed**
	Flange Rating: 150 Flange Facing: Raised Face 125-250 Ra
	Line Size: Inlet/Outlet / inches

DESIGN CONDITIONS

Set Pressure: **HOLD** PSIG	Max Operating Pressure HOLD PSIG
Temperature, ^{o}F: Operating 92 Flowing 92	Vacuum Conditions Inlet/Outlet: /
Static Back Pressure: **HOLD** PSIG	Built-up Back Pressure: **HOLD** PSIG
Vessel MAWP: 55.3 PSIG	Allowable Overpressure: 10%
Service: ☒ Static ☐ Cyclic ☐ Pulsating	Installed Downstream of Rupture Disc: ☐Yes ☒No
Fluid: Heavy Water ☐ Gas ☒ Liquid	MW: 20.03152 C_p/C_v: 1.32
Capacity Required: HOLD lb/hr	Density: 68.89 lb/ft^3 Viscosity: 0.896 cP
Orifice: Calculated Area, in^2: Selected Area, in^2: Orifice Designation:	
Design Basis: Blocked Flow	

ATTACHMENTS / ACCESSORIES

Cap: ☒ Screwed ☐ Bolted	Lever: ☐ Plain ☐ Packed
7.10 ☐ **Test Gag** ☐ **Field Test Connection** ☐ **Pilot Filter**	
☐ Jacket ☐ Bolt-on ☐ Integral Jacket Fluid: Design P: PSIG Design T: ^{o}F	

MATERIALS OF CONSTRUCTION

Body: 316 SS	**Bonnet:** 316 SS
Nozzle: 316 SS	**Disc:** 316 SS
Guide: 316 SS	**Bellows:** 316 SS
Resilient Seats:	**Spring:** 316 SS
Gaskets:	**Flanges:** 316 SS

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Test & Inspection Reports			2
Material Certifications (CMTRs)			2
Code Certificate of Compliance			2
NOTES:			

RELIEF VALVE DATA SHEET

Tag No.: RV-2500D Reflector Plugs Intermediate Outer Plug Feed	A. **Quantity Required: ONE**
Applicable Code: ASME Section VIII Division 1	
Type	☐ **Safety** ☐ **Relief** ☒ **Safety Relief**
	☐ **Conventional** ☒ **Balanced Bellows** ☐ **Pilot Operated**
Connections	☒ **Flanged** ☐ **Screwed**
	Flange Rating: 150 Flange Facing: Raised Face 125-250 Ra
	Line Size: Inlet/Outlet / inches

DESIGN CONDITIONS

Set Pressure: **HOLD** PSIG	Max Operating Pressure HOLD PSIG
Temperature, ^{o}F: Operating 92 Flowing 92	Vacuum Conditions Inlet/Outlet: /
Static Back Pressure: **HOLD** PSIG	Built-up Back Pressure: **HOLD** PSIG
Vessel MAWP: 55.3 PSIG	Allowable Overpressure: 10%
Service: ☒ Static ☐ Cyclic ☐ Pulsating	Installed Downstream of Rupture Disc: ☐Yes ☒No
Fluid: Heavy Water ☐ Gas ☒ Liquid	MW: 20.03152 C_p/C_v: 1.32
Capacity Required: HOLD lb/hr	Density: 68.89 lb/ft^3 Viscosity: 0.896 cP
Orifice: Calculated Area, in^2: Selected Area, in^2: Orifice Designation:	
Design Basis: Blocked Flow	

ATTACHMENTS / ACCESSORIES

Cap: ☒ Screwed ☐ Bolted	Lever: ☐ Plain ☐ Packed
7.11 ☐ **Test Gag** ☐ **Field Test Connection** ☐ **Pilot Filter**	
☐ Jacket ☐ Bolt-on ☐ Integral Jacket Fluid: Design P: PSIG Design T: ^{o}F	

MATERIALS OF CONSTRUCTION

Body: 316 SS	**Bonnet:** 316 SS
Nozzle: 316 SS	**Disc:** 316 SS
Guide: 316 SS	**Bellows:** 316 SS
Resilient Seats:	**Spring:** 316 SS
Gaskets:	**Flanges:** 316 SS

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Material Certifications (CMTRs)			2
Code Certificate of Compliance			2
NOTES:			

RELIEF VALVE DATA SHEET

Tag No.: RV-2500E Reflector Plugs Lower (Bottom) Outer Plug Feed	A. **Quantity Required: ONE**
Applicable Code: ASME Section VIII Division 1	
Type	☐ **Safety** ☐ **Relief** ☒ **Safety Relief**
	☐ **Conventional** ☒ **Balanced Bellows** ☐ **Pilot Operated**
Connections	☒ **Flanged** ☐ **Screwed**
	Flange Rating: 150 Flange Facing: Raised Face 125-250 Ra
	Line Size: Inlet/Outlet / inches

DESIGN CONDITIONS

Set Pressure: **HOLD** PSIG	Max Operating Pressure HOLD PSIG
Temperature, ^{o}F: Operating 92 Flowing 92	Vacuum Conditions Inlet/Outlet: /
Static Back Pressure: **HOLD** PSIG	Built-up Back Pressure: **HOLD** PSIG
Vessel MAWP: 55.3 PSIG	Allowable Overpressure: 10%
Service: ☒ Static ☐ Cyclic ☐ Pulsating	Installed Downstream of Rupture Disc: ☐Yes ☒No
Fluid: Heavy Water ☐ Gas ☒ Liquid	MW: 20.03152 C_p/C_v: 1.32
Capacity Required: HOLD lb/hr	Density: 68.89 lb/ft^3 Viscosity: 0.896 cP
Orifice: Calculated Area, in^2: Selected Area, in^2: Orifice Designation:	
Design Basis: Blocked Flow	

ATTACHMENTS / ACCESSORIES

Cap: ☒ Screwed ☐ Bolted	Lever: ☐ Plain ☐ Packed
7.12 ☐ **Test Gag** ☐ **Field Test Connection** ☐ **Pilot Filter**	
☐ Jacket ☐ Bolt-on ☐ Integral Jacket Fluid: Design P: PSIG Design T: ^{o}F	

MATERIALS OF CONSTRUCTION

Body: 316 SS	**Bonnet:** 316 SS
Nozzle: 316 SS	**Disc:** 316 SS
Guide: 316 SS	**Bellows:** 316 SS
Resilient Seats:	**Spring:** 316 SS
Gaskets:	**Flanges:** 316 SS

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Material Certifications (CMTRs)			2
Code Certificate of Compliance			2
NOTES:			

RELIEF VALVE DATA SHEET

Tag No.: RV-2500F Reflector Plugs Intermediate Inner Plug Feed	A. **Quantity Required: ONE**
Applicable Code: ASME Section VIII Division 1	
Type	☐ **Safety** ☐ **Relief** ☒ **Safety Relief**
	☐ **Conventional** ☒ **Balanced Bellows** ☐ **Pilot Operated**
Connections	☒ **Flanged** ☐ **Screwed**
	Flange Rating: 150 Flange Facing: Raised Face 125-250 Ra
	Line Size: Inlet/Outlet / inches

DESIGN CONDITIONS

Set Pressure: **HOLD** PSIG	Max Operating Pressure HOLD PSIG
Temperature, ^{o}F: Operating 92 Flowing 92	Vacuum Conditions Inlet/Outlet: /
Static Back Pressure: **HOLD** PSIG	Built-up Back Pressure: **HOLD** PSIG
Vessel MAWP: 55.3 PSIG	Allowable Overpressure: 10%
Service: ☒ Static ☐ Cyclic ☐ Pulsating	Installed Downstream of Rupture Disc: ☐Yes ☒No
Fluid: Heavy Water ☐ Gas ☒ Liquid	MW: 20.03152 C_p/C_v: 1.32
Capacity Required: 4,263 lb/hr	Density: 68.89 lb/ft^3 Viscosity: 0.896 cP
Orifice: Calculated Area, in^2: Selected Area, in^2: Orifice Designation:	
Design Basis: Blocked Flow	

ATTACHMENTS / ACCESSORIES

Cap: ☒ Screwed ☐ Bolted	Lever: ☐ Plain ☐ Packed
7.13 ☐ **Test Gag** ☐ **Field Test Connection** ☐ **Pilot Filter**	
☐ Jacket ☐ Bolt-on ☐ Integral Jacket Fluid: Design P: PSIG Design T: ^{o}F	

MATERIALS OF CONSTRUCTION

Body: 316 SS	**Bonnet:** 316 SS
Nozzle: 316 SS	**Disc:** 316 SS
Guide: 316 SS	**Bellows:** 316 SS
Resilient Seats:	**Spring:** 316 SS
Gaskets:	**Flanges:** 316 SS

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Code Certificate of Compliance			2
NOTES:			

RELIEF VALVE DATA SHEET

Tag No.: RV-2500G Reflector Plugs Lower Upper Inner Plug Feed	A. **Quantity Required: ONE**
Applicable Code: ASME Section VIII Division 1	
Type	☐ **Safety** ☐ **Relief** ☒ **Safety Relief**
	☐ **Conventional** ☒ **Balanced Bellows** ☐ **Pilot Operated**
Connections	☒ **Flanged** ☐ **Screwed**
	Flange Rating: 150 Flange Facing: Raised Face 125-250 Ra
	Line Size: Inlet/Outlet / inches

DESIGN CONDITIONS

Set Pressure: **HOLD** PSIG	Max Operating Pressure HOLD PSIG
Temperature, ^{o}F: Operating 92 Flowing 92	Vacuum Conditions Inlet/Outlet: /
Static Back Pressure: **HOLD** PSIG	Built-up Back Pressure: **HOLD** PSIG
Vessel MAWP: 55.3 PSIG	Allowable Overpressure: 10%
Service: ☒ Static ☐ Cyclic ☐ Pulsating	Installed Downstream of Rupture Disc: ☐Yes ☒No
Fluid: Heavy Water ☐ Gas ☒ Liquid	MW: 20.03152 C_p/C_v: 1.32
Capacity Required: 33,154 lb/hr	Density: 68.89 lb/ft^3 Viscosity: 0.896 cP
Orifice: Calculated Area, in^2: Selected Area, in^2: Orifice Designation:	
Design Basis: Blocked Flow	

ATTACHMENTS / ACCESSORIES

Cap: ☒ Screwed ☐ Bolted	Lever: ☐ Plain ☐ Packed
7.14 ☐ **Test Gag** ☐ **Field Test Connection** ☐ **Pilot Filter**	
☐ Jacket ☐ Bolt-on ☐ Integral Jacket Fluid: Design P: PSIG Design T: ^{o}F	

MATERIALS OF CONSTRUCTION

Body: 316 SS	**Bonnet:** 316 SS
Nozzle: 316 SS	**Disc:** 316 SS
Guide: 316 SS	**Bellows:** 316 SS
Resilient Seats:	**Spring:** 316 SS
Gaskets:	**Flanges:** 316 SS

DOCUMENTATION

	With Bids	Approval	Certified
Outline Dimensional Drawings	2		2

Operation & Performance Data	2		2
Literature & Parts List	2		2
Operating & Maintenance Instructions			2
Installation Instructions			2
Test & Inspection Reports			2
Material Certifications (CMTRs)			2
Code Certificate of Compliance			2
NOTES:			

RELIEF VALVE DATA SHEET

Tag No.: RV-2500H Reflector Plugs Lower Lower Inner Plug Feed	A. **Quantity Required: ONE**
Applicable Code: ASME Section VIII Division 1	
Type	☐ **Safety** ☐ **Relief** ☒ **Safety Relief**
	☐ **Conventional** ☒ **Balanced Bellows** ☐ **Pilot Operated**
Connections	☒ **Flanged** ☐ **Screwed**
	Flange Rating: 150 Flange Facing: Raised Face 125-250 Ra
	Line Size: Inlet/Outlet / inches

DESIGN CONDITIONS

Set Pressure: **HOLD** PSIG	Max Operating Pressure HOLD PSIG
Temperature, ^{o}F: Operating 92 Flowing 92	Vacuum Conditions Inlet/Outlet: /
Static Back Pressure: **HOLD** PSIG	Built-up Back Pressure: **HOLD** PSIG
Vessel MAWP: 55.3 PSIG	Allowable Overpressure: 10%
Service: ☒ Static ☐ Cyclic ☐ Pulsating	Installed Downstream of Rupture Disc: ☐Yes ☒No
Fluid: Heavy Water ☐ Gas ☒ Liquid	MW: 20.03152 C_p/C_v: 1.32
Capacity Required: 33,154 lb/hr	Density: 68.89 lb/ft^3 Viscosity: 0.896 cP
Orifice: Calculated Area, in^2: Selected Area, in^2: Orifice Designation:	
Design Basis: Blocked Flow	

ATTACHMENTS / ACCESSORIES

Cap: ☒ Screwed ☐ Bolted	Lever: ☐ Plain ☐ Packed
7.15 ☐ **Test Gag** ☐ **Field Test Connection** ☐ **Pilot Filter**	
☐ Jacket ☐ Bolt-on ☐ Integral Jacket Fluid: Design P: PSIG Design T: ^{o}F	

MATERIALS OF CONSTRUCTION

Body: 316 SS	**Bonnet:** 316 SS
Nozzle: 316 SS	**Disc:** 316 SS
Guide: 316 SS	**Bellows:** 316 SS
Resilient Seats:	**Spring:** 316 SS
Gaskets:	**Flanges:** 316 SS

DOCUMENTATION

	With Bids	Approval	Certified
Outline Dimensional Drawings	2		2

Operation & Performance Data	2		2
Literature & Parts List	2		2
Operating & Maintenance Instructions			2
Installation Instructions			2
Test & Inspection Reports			2
Material Certifications (CMTRs)			2
Code Certificate of Compliance			2
NOTES:			

RELIEF VALVE DATA SHEET

Tag No.: RV-2500J Reflector Plugs Lower Middle Inner Plug Feed	A. **Quantity Required: ONE**
Applicable Code: ASME Section VIII Division 1	
Type	☐ **Safety** ☐ **Relief** ☒ **Safety Relief**
	☐ **Conventional** ☒ **Balanced Bellows** ☐ **Pilot Operated**
Connections	☒ **Flanged** ☐ **Screwed**
	Flange Rating: 150 Flange Facing: Raised Face 125-250 Ra
	Line Size: Inlet/Outlet / inches

DESIGN CONDITIONS

Set Pressure: **HOLD** PSIG	Max Operating Pressure HOLD PSIG
Temperature, ^{o}F: Operating 92 Flowing 92	Vacuum Conditions Inlet/Outlet: /
Static Back Pressure: **HOLD** PSIG	Built-up Back Pressure: **HOLD** PSIG
Vessel MAWP: 55.3 PSIG	Allowable Overpressure: 10%
Service: ☒ Static ☐ Cyclic ☐ Pulsating	Installed Downstream of Rupture Disc: ☐Yes ☒No
Fluid: Heavy Water ☐ Gas ☒ Liquid	MW: 20.03152 C_p/C_v: 1.32
Capacity Required: 16,577 lb/hr	Density: 68.89 lb/ft^3 Viscosity: 0.896 cP
Orifice: Calculated Area, in^2: Selected Area, in^2: Orifice Designation:	
Design Basis: Blocked Flow	

ATTACHMENTS / ACCESSORIES

Cap: ☒ Screwed ☐ Bolted	Lever: ☐ Plain ☐ Packed
7.16 ☐ **Test Gag** ☐ **Field Test Connection** ☐ **Pilot Filter**	
☐ Jacket ☐ Bolt-on ☐ Integral Jacket Fluid: Design P: PSIG Design T: ^{o}F	

MATERIALS OF CONSTRUCTION

Body: 316 SS	**Bonnet:** 316 SS
Nozzle: 316 SS	**Disc:** 316 SS
Guide: 316 SS	**Bellows:** 316 SS
Resilient Seats:	**Spring:** 316 SS
Gaskets:	**Flanges:** 316 SS

DOCUMENTATION

	With Bids	Approval	Certified
Outline Dimensional Drawings	2		2

Operation & Performance Data	2		2
Literature & Parts List	2		2
Operating & Maintenance Instructions			2
Installation Instructions			2
Test & Inspection Reports			2
Material Certifications (CMTRs)			2
Code Certificate of Compliance			2
NOTES:			

RELIEF VALVE DATA SHEET

Tag No.: RV-9301 Ring Injection Beam Stop Window Feed	A. **Quantity Required: ONE**
Applicable Code: ASME Section VIII Division 1	
Type	☐ **Safety** ☐ **Relief** ☒ **Safety Relief**
	☐ **Conventional** ☒ **Balanced Bellows** ☐ **Pilot Operated**
Connections	☒ **Flanged** ☐ **Screwed**
	Flange Rating: 150 Flange Facing: Raised Face 125-250 Ra
	Line Size: Inlet/Outlet / inches

DESIGN CONDITIONS

Set Pressure: **HOLD** PSIG	Max Operating Pressure HOLD PSIG
Temperature, ^{o}F: Operating 92 Flowing 92	Vacuum Conditions Inlet/Outlet: /
Static Back Pressure: **HOLD** PSIG	Built-up Back Pressure: **HOLD** PSIG
Vessel MAWP: HOLD PSIG	Allowable Overpressure: 10%
Service: ☒ Static ☐ Cyclic ☐ Pulsating	Installed Downstream of Rupture Disc: ☐Yes ☒No
Fluid: Water ☐ Gas ☒ Liquid	MW: 18.0152 C_p/C_v: 1.329
Capacity Required: 750 lb/hr	Density: 62.09 lb/ft^3 Viscosity: 0.744 cP
Orifice: Calculated Area, in^2: Selected Area, in^2: Orifice Designation:	
Design Basis: Blocked Flow	

ATTACHMENTS / ACCESSORIES

Cap: ☒ Screwed ☐ Bolted	Lever: ☐ Plain ☐ Packed
7.17 ☐ **Test Gag** ☐ **Field Test Connection** ☐ **Pilot Filter**	
☐ Jacket ☐ Bolt-on ☐ Integral Jacket Fluid: Design P: PSIG Design T: ^{o}F	

MATERIALS OF CONSTRUCTION

Body: 316 SS	**Bonnet:** 316 SS
Nozzle: 316 SS	**Disc:** 316 SS
Guide: 316 SS	**Bellows:** 316 SS
Resilient Seats:	**Spring:** 316 SS
Gaskets:	**Flanges:** 316 SS

DOCUMENTATION

	With Bids	Approval	Certified
Outline Dimensional Drawings	2		2

Operation & Performance Data	2		2
Literature & Parts List	2		2
Operating & Maintenance Instructions			2
Installation Instructions			2
Test & Inspection Reports			2
Material Certifications (CMTRs)			2
Code Certificate of Compliance			2
NOTES:			

RELIEF VALVE DATA SHEET

Tag No.: RV-9302 Ring Injection Beam Stop Feed	A. **Quantity Required: ONE**
Applicable Code: ASME Section VIII Division 1	
Type	☐ **Safety** ☐ **Relief** ☒ **Safety Relief**
	☐ **Conventional** ☒ **Balanced Bellows** ☐ **Pilot Operated**
Connections	☒ **Flanged** ☐ **Screwed**
	Flange Rating: 150 Flange Facing: Raised Face 125-250 Ra
	Line Size: Inlet/Outlet / inches

DESIGN CONDITIONS

Set Pressure: **HOLD** PSIG	Max Operating Pressure HOLD PSIG
Temperature, °F: Operating 92 Flowing 92	Vacuum Conditions Inlet/Outlet: /
Static Back Pressure: **HOLD** PSIG	Built-up Back Pressure: **HOLD** PSIG
Vessel MAWP: 150 PSIG	Allowable Overpressure: 10%
Service: ☒ Static ☐ Cyclic ☐ Pulsating	Installed Downstream of Rupture Disc: ☐Yes ☒No
Fluid: Water ☐ Gas ☒ Liquid	MW: 18.0152 C_p/C_v: 1.329
Capacity Required: 22,500 lb/hr	Density: 62.09 lb/ft^3 Viscosity: 0.744 cP
Orifice: Calculated Area, in^2: Selected Area, in^2: Orifice Designation:	
Design Basis: Blocked Flow	

ATTACHMENTS / ACCESSORIES

Cap: ☒ Screwed ☐ Bolted	Lever: ☐ Plain ☐ Packed
7.18 ☐ **Test Gag** ☐ **Field Test Connection** ☐ **Pilot Filter**	
☐ Jacket ☐ Bolt-on ☐ Integral Jacket Fluid: Design P: PSIG Design T: °F	

MATERIALS OF CONSTRUCTION

Body: 316 SS	**Bonnet:** 316 SS
Nozzle: 316 SS	**Disc:** 316 SS
Guide: 316 SS	**Bellows:** 316 SS
Resilient Seats:	**Spring:** 316 SS
Gaskets:	**Flanges:** 316 SS

DOCUMENTATION

	With Bids	Approval	Certified
Outline Dimensional Drawings	2		2
Operation & Performance Data	2		2

Literature & Parts List	2		2
Operating & Maintenance Instructions			2
Installation Instructions			2
Test & Inspection Reports			2
Material Certifications (CMTRs)			2
Code Certificate of Compliance			2
NOTES:			

RUPTURE DISC DATA SHEET

Tag No.: RD-1251 Mercury Exchanger Loop G/L Separator	A. **Quantity Required: ONE**

Applicable Code: ASME Code, Section VIII, Division 1

DISC	☐ **Forward Acting** ☐ **Scored**
	☒ **Reverse Acting** ☐ **Scored** ☐ **Knife Blade**
	☒ **Non-Fragmenting** ☐ **Sanitary** ☐ **Polymerizing Service** ☐ **Composite**
HOLDER	☐ **None** ☒ **Insert** ☐ **Bolted** ☐ **Threaded** ☐ **Union**
	☐ **Sanitary** ☐ **Flow Sweeps Disc**
	Line Size: 3 inches

DESIGN CONDITIONS

Burst Pressure: 150 PSIG	Manufacturing Range: +0/-5%
Burst Temperature: 113 ^{o}F	Vacuum Conditions Inlet/Outlet: FV / -
Static Back Pressure: 0 PSIG	Built-up Back Pressure: **HOLD** PSIG
Vessel MAWP 150 PSIG	Normal Max Operating Pressure 135 PSIG
Service: ☒ Static ☐ Cyclic ☐ Pulsating	Installed Upstream of PSV: ☐ Yes ☒ No
Fluid: Water ☐ Gas ☒ Liquid	MW: 18.0152 C_p/C_v: 1.329
Capacity Required: 200,742 lb/hr	Density: 61.8 lb/ft^3 Viscosity: 0.596 cP

ATTACHMENTS / ACCESSORIES

☒ Burst Disc Indicator: ☒ Closed circuit ☐ Open Contact ☐ Optical Class 1 Group B Div 2
☐ **Jack Screws** ☐ **Gauge Tap (¼" on inlet/outlet)** ☐ **Tell-tale Assembly**
☐ Pre-assembly Screws ☐ Baffle Plate ☐

MATERIALS OF CONSTRUCTION

Disc: 316L SS	**Holder:** 316L SS
Gaskets:	**Flanges:**
Seal (for Composite):	

DOCUMENTATION

	With Bids	Approval	Certified
Outline Dimensional Drawings	2		2
Operation & Performance Data	2		2
Literature & Parts List	2		2

Operating & Maintenance Instructions			2
Installation Instructions			2
Test & Inspection Reports			2
Material Certifications (CMTRs)			2
Code Certificate of Compliance			2
NOTES:			

RUPTURE DISC DATA SHEET

Tag No.: RD-1252 Mercury Exchanger Loop Filter	B. **Quantity Required: ONE**

Applicable Code: ASME Code, Section VIII, Division 1

DISC	☐ **Forward Acting** ☐ **Scored**
	☒ **Reverse Acting** ☐ **Scored** ☐ **Knife Blade**
	☒ **Non-Fragmenting** ☐ **Sanitary** ☐ **Polymerizing Service** ☐ **Composite**
HOLDER	☐ **None** ☒ **Insert** ☐ **Bolted** ☐ **Threaded** ☐ **Union**
	☐ **Sanitary** ☐ **Flow Sweeps Disc**
	Line Size: 3/4 inches

DESIGN CONDITIONS

Burst Pressure: 150 PSIG	Manufacturing Range: +0/-5%
Burst Temperature: 366 ^{o}F	Vacuum Conditions Inlet/Outlet: FV / -
Static Back Pressure: 0 PSIG	Built-up Back Pressure: **HOLD** PSIG
Vessel MAWP 150 PSIG	Normal Max Operating Pressure 135 PSIG
Service: ☒ Static ☐ Cyclic ☐ Pulsating	Installed Upstream of PSV: ☐ Yes ☒ No
Fluid: Water ☒ Gas ☐ Liquid	MW: 18.0152 C_p/C_v: 1.329
Capacity Required: 1,085 lb/hr	Density: 0.363 lb/ft^3 Viscosity: 0.0156 cP

ATTACHMENTS / ACCESSORIES

☒ Burst Disc Indicator: ☒ Closed circuit ☐ Open Contact ☐ Optical Class 1 Group B Div 2
☐ **Jack Screws** ☐ **Gauge Tap (¼" on inlet/outlet)** ☐ **Tell-tale Assembly**
☐ Pre-assembly Screws ☐ Baffle Plate ☐

MATERIALS OF CONSTRUCTION

Disc: 316L SS	**Holder:** 316L SS
Gaskets:	**Flanges:**
Seal (for Composite):	

DOCUMENTATION

	With Bids	Approval	Certified
Outline Dimensional Drawings	2		2
Operation & Performance Data	2		2
Literature & Parts List	2		2

Operating & Maintenance Instructions			2
Installation Instructions			2
Test & Inspection Reports			2
Material Certifications (CMTRs)			2
Code Certificate of Compliance			2
NOTES:			

RUPTURE DISC DATA SHEET

Tag No.: RD-1253 Mercury Exchanger Loop Drain Tank	C. **Quantity Required: ONE**

Applicable Code: ASME Code, Section VIII, Division 1

DISC	☐ **Forward Acting** ☐ **Scored**
	☒ **Reverse Acting** ☐ **Scored** ☐ **Knife Blade**
	☒ **Non-Fragmenting** ☐ **Sanitary** ☐ **Polymerizing Service** ☐ **Composite**
HOLDER	☐ **None** ☒ **Insert** ☐ **Bolted** ☐ **Threaded** ☐ **Union**
	☐ **Sanitary** ☐ **Flow Sweeps Disc**
	Line Size: 1 inches

DESIGN CONDITIONS

Burst Pressure: 150 PSIG	Manufacturing Range: +0/-5%
Burst Temperature: 366 ^{o}F	Vacuum Conditions Inlet/Outlet: FV / -
Static Back Pressure: 0 PSIG	Built-up Back Pressure: **HOLD** PSIG
Vessel MAWP 150 PSIG	Normal Max Operating Pressure 135 PSIG
Service: ☒ Static ☐ Cyclic ☐ Pulsating	Installed Upstream of PSV: ☐ Yes ☒ No
Fluid: Water ☒ Gas ☐ Liquid	MW: 18.0152 C_p/C_v: 1.329
Capacity Required: 2,113 lb/hr	Density: 0.363 lb/ft^3 Viscosity: 0.0156 cP

ATTACHMENTS / ACCESSORIES

☒ Burst Disc Indicator: ☒ Closed circuit ☐ Open Contact ☐ Optical Class 1 Group B Div 2
☐ **Jack Screws** ☐ **Gauge Tap (¼" on inlet/outlet)** ☐ **Tell-tale Assembly**
☐ Pre-assembly Screws ☐ Baffle Plate ☐

MATERIALS OF CONSTRUCTION

Disc: 316L SS	**Holder:** 316L SS
Gaskets:	**Flanges:**
Seal (for Composite):	

DOCUMENTATION

	With Bids	Approval	Certified
Outline Dimensional Drawings	2		2
Operation & Performance Data	2		2

Literature & Parts List	2		2
Operating & Maintenance Instructions			2
Installation Instructions			2
Test & Inspection Reports			2
Material Certifications (CMTRs)			2
Code Certificate of Compliance			2
NOTES:			

RUPTURE DISC DATA SHEET

Tag No.: RD-1751 Target Shroud/Proton Beam Window Loop Filter	D. **Quantity Required: ONE**

Applicable Code: ASME Code, Section VIII, Division 1

DISC	☐ **Forward Acting** ☐ **Scored**
	☒ **Reverse Acting** ☐ **Scored** ☐ **Knife Blade**
	☒ **Non-Fragmenting** ☐ **Sanitary** ☐ **Polymerizing Service** ☐ **Composite**
HOLDER	☐ **None** ☒ **Insert** ☐ **Bolted** ☐ **Threaded** ☐ **Union**
	☐ **Sanitary** ☐ **Flow Sweeps Disc**
	Line Size: 1 inches

DESIGN CONDITIONS

Burst Pressure: 150 PSIG	Manufacturing Range: +0/-5%
Burst Temperature: 366 ^{o}F	Vacuum Conditions Inlet/Outlet: FV / -
Static Back Pressure: 0 PSIG	Built-up Back Pressure: **HOLD** PSIG
Vessel MAWP 150 PSIG	Normal Max Operating Pressure 135 PSIG
Service: ☒ Static ☐ Cyclic ☐ Pulsating	Installed Upstream of PSV: ☐ Yes ☒ No
Fluid: Water ☒ Gas ☐ Liquid	MW: 18.0152 C_p/C_v: 1.329
Capacity Required: 1,530 lb/hr	Density: 0.363 lb/ft^3 Viscosity: 0.0156 cP

ATTACHMENTS / ACCESSORIES

☒ Burst Disc Indicator: ☒ Closed circuit ☐ Open Contact ☐ Optical Class 1 Group B Div 2
☐ **Jack Screws** ☐ **Gauge Tap (¼" on inlet/outlet)** ☐ **Tell-tale Assembly**
☐ Pre-assembly Screws ☐ Baffle Plate ☐

MATERIALS OF CONSTRUCTION

Disc: 316L SS	**Holder:** 316L SS
Gaskets:	**Flanges:**
Seal (for Composite):	

DOCUMENTATION

	With Bids	Approval	Certified
Outline Dimensional Drawings	2		2
Operation & Performance Data	2		2

Literature & Parts List	2		2
Operating & Maintenance Instructions			2
Installation Instructions			2
Test & Inspection Reports			2
Material Certifications (CMTRs)			2
Code Certificate of Compliance			2
NOTES:			

RUPTURE DISC DATA SHEET

Tag No.: RD-1752 Target Shroud/Proton Beam Window Loop Drain Tank	E. **Quantity Required: ONE**

Applicable Code: ASME Code, Section VIII, Division 1

DISC	☐ **Forward Acting** ☐ **Scored**
	☒ **Reverse Acting** ☐ **Scored** ☐ **Knife Blade**
	☒ **Non-Fragmenting** ☐ **Sanitary** ☐ **Polymerizing Service** ☐ **Composite**
HOLDER	☐ **None** ☒ **Insert** ☐ **Bolted** ☐ **Threaded** ☐ **Union**
	☐ **Sanitary** ☐ **Flow Sweeps Disc**
	Line Size: 3/4 inches

DESIGN CONDITIONS

Burst Pressure: 150 PSIG	Manufacturing Range: +0/-5%
Burst Temperature: 366 ^{o}F	Vacuum Conditions Inlet/Outlet: FV / -
Static Back Pressure: 0 PSIG	Built-up Back Pressure: **HOLD** PSIG
Vessel MAWP 150 PSIG	Normal Max Operating Pressure 135 PSIG
Service: ☒ Static ☐ Cyclic ☐ Pulsating	Installed Upstream of PSV: ☐ Yes ☒ No
Fluid: Water ☒ Gas ☐ Liquid	MW: 18.0152 C_p/C_v: 1.329
Capacity Required: 1,760 lb/hr	Density: 0.363 lb/ft^3 Viscosity: 0.0156 cP

ATTACHMENTS / ACCESSORIES

☒ Burst Disc Indicator: ☒ Closed circuit ☐ Open Contact ☐ Optical Class 1 Group B Div 2
☐ **Jack Screws** ☐ **Gauge Tap (¼" on inlet/outlet)** ☐ **Tell-tale Assembly**
☐ Pre-assembly Screws ☐ Baffle Plate ☐

MATERIALS OF CONSTRUCTION

Disc: 316L SS	**Holder:** 316L SS
Gaskets:	**Flanges:**
Seal (for Composite):	

DOCUMENTATION

	With Bids	Approval	Certified
Outline Dimensional Drawings	2		2
Operation & Performance Data	2		2
Literature & Parts List	2		2

Operating & Maintenance Instructions			2
Installation Instructions			2
Test & Inspection Reports			2
Material Certifications (CMTRs)			2
Code Certificate of Compliance			2
NOTES:			

RUPTURE DISC DATA SHEET

Tag No.: RD-1753 Target Shroud/Proton Beam Window Loop G/L Sep.	F. **Quantity Required: ONE**

Applicable Code: ASME Code, Section VIII, Division 1

DISC	☐ **Forward Acting** ☐ **Scored**
	☒ **Reverse Acting** ☐ **Scored** ☐ **Knife Blade**
	☒ **Non-Fragmenting** ☐ **Sanitary** ☐ **Polymerizing Service** ☐ **Composite**
HOLDER	☐ **None** ☒ **Insert** ☐ **Bolted** ☐ **Threaded** ☐ **Union**
	☐ **Sanitary** ☐ **Flow Sweeps Disc**
	Line Size: 2 inches

DESIGN CONDITIONS

Burst Pressure: 53 PSIG	Manufacturing Range: +0/-5%
Burst Temperature: 101 ^{o}F	Vacuum Conditions Inlet/Outlet: FV / -
Static Back Pressure: 0 PSIG	Built-up Back Pressure: **HOLD** PSIG
Vessel MAWP 150 PSIG	Normal Max Operating Pressure 47 PSIG
Service: ☒ Static ☐ Cyclic ☐ Pulsating	Installed Upstream of PSV: ☐ Yes ☒ No
Fluid: Water ☐ Gas ☒ Liquid	MW: 18.0152 C_p/C_v: 1.329
Capacity Required: 45,036 lb/hr	Density: 62.0 lb/ft^3 Viscosity: 0.674 cP

ATTACHMENTS / ACCESSORIES

☒ Burst Disc Indicator: ☒ Closed circuit ☐ Open Contact ☐ Optical Class 1 Group B Div 2
☐ **Jack Screws** ☐ **Gauge Tap (¼" on inlet/outlet)** ☐ **Tell-tale Assembly**
☐ Pre-assembly Screws ☐ Baffle Plate ☐

MATERIALS OF CONSTRUCTION

Disc: 316L SS	**Holder:** 316L SS
Gaskets:	**Flanges:**
Seal (for Composite):	

DOCUMENTATION

	With Bids	Approval	Certified
Outline Dimensional Drawings	2		2
Operation & Performance Data	2		2

Literature & Parts List	2		2
Operating & Maintenance Instructions			2
Installation Instructions			2
Test & Inspection Reports			2
Material Certifications (CMTRs)			2
Code Certificate of Compliance			2
NOTES:			

RUPTURE DISC DATA SHEET

Tag No.: RD-2251 Moderators/Shutters/Inserts Loop Filter	G. **Quantity Required: ONE**

Applicable Code: ASME Code, Section VIII, Division 1

DISC	☐ **Forward Acting** ☐ **Scored**
	☒ **Reverse Acting** ☐ **Scored** ☐ **Knife Blade**
	☒ **Non-Fragmenting** ☐ **Sanitary** ☐ **Polymerizing Service** ☐ **Composite**
HOLDER	☐ **None** ☒ **Insert** ☐ **Bolted** ☐ **Threaded** ☐ **Union**
	☐ **Sanitary** ☐ **Flow Sweeps Disc**
	Line Size: 1 inches

DESIGN CONDITIONS

Burst Pressure: 150 PSIG	Manufacturing Range: +0/-5%
Burst Temperature: 366 ^{o}F	Vacuum Conditions Inlet/Outlet: FV / -
Static Back Pressure: 0 PSIG	Built-up Back Pressure: **HOLD** PSIG
Vessel MAWP 150 PSIG	Normal Max Operating Pressure 135 PSIG
Service: ☒ Static ☐ Cyclic ☐ Pulsating	Installed Upstream of PSV: ☐ Yes ☒ No
Fluid: Water ☒ Gas ☐ Liquid	MW: 18.0152 C_p/C_v: 1.329
Capacity Required: 1,536 lb/hr	Density: 0.363 lb/ft^3 Viscosity: 0.0156 cP

ATTACHMENTS / ACCESSORIES

☒ Burst Disc Indicator: ☒ Closed circuit ☐ Open Contact ☐ Optical Class 1 Group B Div 2
☐ **Jack Screws** ☐ **Gauge Tap (¼" on inlet/outlet)** ☐ **Tell-tale Assembly**
☐ Pre-assembly Screws ☐ Baffle Plate ☐

MATERIALS OF CONSTRUCTION

Disc: 316L SS	**Holder:** 316L SS
Gaskets:	**Flanges:**
Seal (for Composite):	

DOCUMENTATION

	With Bids	Approval	Certified
Outline Dimensional Drawings	2		2
Operation & Performance Data	2		2

Literature & Parts List	2		2
Operating & Maintenance Instructions			2
Installation Instructions			2
Test & Inspection Reports			2
Material Certifications (CMTRs)			2
Code Certificate of Compliance			2
NOTES:			

RUPTURE DISC DATA SHEET

Tag No.: RD-2252 Moderators/Shutters/Inserts Loop Drain Tank	H. **Quantity Required: ONE**

Applicable Code: ASME Code, Section VIII, Division 1

DISC	☐ **Forward Acting** ☐ **Scored**
	☒ **Reverse Acting** ☐ **Scored** ☐ **Knife Blade**
	☒ **Non-Fragmenting** ☐ **Sanitary** ☐ **Polymerizing Service** ☐ **Composite**
HOLDER	☐ **None** ☒ **Insert** ☐ **Bolted** ☐ **Threaded** ☐ **Union**
	☐ **Sanitary** ☐ **Flow Sweeps Disc**
	Line Size: 3/4 inches

DESIGN CONDITIONS

Burst Pressure: 150 PSIG	Manufacturing Range: +0/-5%
Burst Temperature: 366 ^{o}F	Vacuum Conditions Inlet/Outlet: FV / -
Static Back Pressure: 0 PSIG	Built-up Back Pressure: **HOLD** PSIG
Vessel MAWP 150 PSIG	Normal Max Operating Pressure 135 PSIG
Service: ☒ Static ☐ Cyclic ☐ Pulsating	Installed Upstream of PSV: ☐ Yes ☒ No
Fluid: Water ☒ Gas ☐ Liquid	MW: 18.0152 C_p/C_v: 1.329
Capacity Required: 1,372 lb/hr	Density: 0.363 lb/ft^3 Viscosity: 0.0156 cP

ATTACHMENTS / ACCESSORIES

☒ Burst Disc Indicator: ☒ Closed circuit ☐ Open Contact ☐ Optical Class 1 Group B Div 2
☐ **Jack Screws** ☐ **Gauge Tap (¼" on inlet/outlet)** ☐ **Tell-tale Assembly**
☐ Pre-assembly Screws ☐ Baffle Plate ☐

MATERIALS OF CONSTRUCTION

Disc: 316L SS	**Holder:** 316L SS
Gaskets:	**Flanges:**
Seal (for Composite):	

DOCUMENTATION

	With Bids	Approval	Certified
Outline Dimensional Drawings	2		2
Operation & Performance Data	2		2

Literature & Parts List	2		2
Operating & Maintenance Instructions			2
Installation Instructions			2
Test & Inspection Reports			2
Material Certifications (CMTRs)			2
Code Certificate of Compliance			2
NOTES:			

RUPTURE DISC DATA SHEET

Tag No.: RD-2253 Moderators/Shutters/Inserts Loop G/L Separator	I. **Quantity Required: ONE**

Applicable Code: ASME Code, Section VIII, Division 1

DISC	☐ **Forward Acting** ☐ **Scored**
	☒ **Reverse Acting** ☐ **Scored** ☐ **Knife Blade**
	☒ **Non-Fragmenting** ☐ **Sanitary** ☐ **Polymerizing Service** ☐ **Composite**
HOLDER	☐ **None** ☒ **Insert** ☐ **Bolted** ☐ **Threaded** ☐ **Union**
	☐ **Sanitary** ☐ **Flow Sweeps Disc**
	Line Size: 2 inches

DESIGN CONDITIONS

Burst Pressure: 58 PSIG	Manufacturing Range: +0/-5%
Burst Temperature: 306 ^{o}F	Vacuum Conditions Inlet/Outlet: FV / -
Static Back Pressure: 0 PSIG	Built-up Back Pressure: **HOLD** PSIG
Vessel MAWP 150 PSIG	Normal Max Operating Pressure 52 PSIG
Service: ☒ Static ☐ Cyclic ☐ Pulsating	Installed Upstream of PSV: ☐ Yes ☒ No
Fluid: Water ☒ Gas ☐ Liquid	MW: 18.0152 C_p/C_v: 1.329
Capacity Required: 863 lb/hr	Density: 0.168 lb/ft^3 Viscosity: 0.0143 cP

ATTACHMENTS / ACCESSORIES

☒ Burst Disc Indicator: ☒ Closed circuit ☐ Open Contact ☐ Optical Class 1 Group B Div 2
☐ **Jack Screws** ☐ **Gauge Tap (¼" on inlet/outlet)** ☐ **Tell-tale Assembly**
☐ Pre-assembly Screws ☐ Baffle Plate ☐

MATERIALS OF CONSTRUCTION

Disc: 316L SS	**Holder:** 316L SS
Gaskets:	**Flanges:**
Seal (for Composite):	

DOCUMENTATION

	With Bids	Approval	Certified
Outline Dimensional Drawings	2		2
Operation & Performance Data	2		2

Literature & Parts List	2		2
Operating & Maintenance Instructions			2
Installation Instructions			2
Test & Inspection Reports			2
Material Certifications (CMTRs)			2
Code Certificate of Compliance			2
NOTES:			

RUPTURE DISC DATA SHEET

Tag No.: RD-2751 Reflector Plugs Loop G/L Separator	**J. Quantity Required: ONE**

Applicable Code: ASME Code, Section VIII, Division 1

DISC	☐ **Forward Acting** ☐ **Scored**
	☒ **Reverse Acting** ☐ **Scored** ☐ **Knife Blade**
	☒ **Non-Fragmenting** ☐ **Sanitary** ☐ **Polymerizing Service** ☐ **Composite**
HOLDER	☐ **None** ☒ **Insert** ☐ **Bolted** ☐ **Threaded** ☐ **Union**
	☐ **Sanitary** ☐ **Flow Sweeps Disc**
	Line Size: 3 inches

DESIGN CONDITIONS

Burst Pressure: 70 PSIG	Manufacturing Range: +0/-5%
Burst Temperature: 110 ^{o}F	Vacuum Conditions Inlet/Outlet: FV / -
Static Back Pressure: 0 PSIG	Built-up Back Pressure: **HOLD** PSIG
Vessel MAWP 150 PSIG	Normal Max Operating Pressure 63 PSIG
Service: ☒ Static ☐ Cyclic ☐ Pulsating	Installed Upstream of PSV: ☐ Yes ☒ No
Fluid: Heavy Water ☐ Gas ☒ Liquid	MW: 20.031 C_p/C_v: 1.32
Capacity Required: 140,720 lb/hr	Density: 68.6 lb/ft^3 Viscosity: 0.728 cP

ATTACHMENTS / ACCESSORIES

☒ Burst Disc Indicator: ☒ Closed circuit ☐ Open Contact ☐ Optical Class 1 Group B Div 2
☐ **Jack Screws** ☐ **Gauge Tap (¼" on inlet/outlet)** ☐ **Tell-tale Assembly**
☐ Pre-assembly Screws ☐ Baffle Plate ☐

MATERIALS OF CONSTRUCTION

Disc: 316L SS	**Holder:** 316L SS
Gaskets:	**Flanges:**
Seal (for Composite):	

DOCUMENTATION

	With Bids	Approval	Certified
Outline Dimensional Drawings	2		2
Operation & Performance Data	2		2

Literature & Parts List	2		2
Operating & Maintenance Instructions			2
Installation Instructions			2
Test & Inspection Reports			2
Material Certifications (CMTRs)			2
Code Certificate of Compliance			2
NOTES:			

RUPTURE DISC DATA SHEET

Tag No.: RD-2752 Reflector Plugs Loop Filter	K. **Quantity Required: ONE**

Applicable Code: ASME Code, Section VIII, Division 1

DISC	☐ **Forward Acting** ☐ **Scored**
	☒ **Reverse Acting** ☐ **Scored** ☐ **Knife Blade**
	☒ **Non-Fragmenting** ☐ **Sanitary** ☐ **Polymerizing Service** ☐ **Composite**
HOLDER	☐ **None** ☒ **Insert** ☐ **Bolted** ☐ **Threaded** ☐ **Union**
	☐ **Sanitary** ☐ **Flow Sweeps Disc**
	Line Size: 1-1/2 inches

DESIGN CONDITIONS

Burst Pressure: 150 PSIG	Manufacturing Range: +0/-5%
Burst Temperature: 367 ^{o}F	Vacuum Conditions Inlet/Outlet: FV / -
Static Back Pressure: 0 PSIG	Built-up Back Pressure: **HOLD** PSIG
Vessel MAWP 150 PSIG	Normal Max Operating Pressure 135 PSIG
Service: ☒ Static ☐ Cyclic ☐ Pulsating	Installed Upstream of PSV: ☐ Yes ☒ No
Fluid: Heavy Water ☒ Gas ☐ Liquid	MW: 20.031 C_p/C_v: 1.32
Capacity Required: 2,835 lb/hr	Density: 0.372 lb/ft^3 Viscosity: 0.0157 cP

ATTACHMENTS / ACCESSORIES

☒ Burst Disc Indicator: ☒ Closed circuit ☐ Open Contact ☐ Optical Class 1 Group B Div 2
☐ **Jack Screws** ☐ **Gauge Tap (¼" on inlet/outlet)** ☐ **Tell-tale Assembly**
☐ Pre-assembly Screws ☐ Baffle Plate ☐

MATERIALS OF CONSTRUCTION

Disc: 316L SS	**Holder:** 316L SS
Gaskets:	**Flanges:**
Seal (for Composite):	

DOCUMENTATION

	With Bids	Approval	Certified
Outline Dimensional Drawings	2		2
Operation & Performance Data	2		2
Literature & Parts List	2		2

Operating & Maintenance Instructions			2
Installation Instructions			2
Test & Inspection Reports			2
Material Certifications (CMTRs)			2
Code Certificate of Compliance			2
NOTES:			

RUPTURE DISC DATA SHEET

Tag No.: RD-2753 Reflector Plugs Loop Drain Tank	L. **Quantity Required: ONE**

Applicable Code: ASME Code, Section VIII, Division 1

DISC	☐ **Forward Acting** ☐ **Scored**
	☒ **Reverse Acting** ☐ **Scored** ☐ **Knife Blade**
	☒ **Non-Fragmenting** ☐ **Sanitary** ☐ **Polymerizing Service** ☐ **Composite**
HOLDER	☐ **None** ☒ **Insert** ☐ **Bolted** ☐ **Threaded** ☐ **Union**
	☐ **Sanitary** ☐ **Flow Sweeps Disc**
	Line Size: 1-1/2 inches

DESIGN CONDITIONS

Burst Pressure: 150 PSIG	Manufacturing Range: +0/-5%
Burst Temperature: 70 ^{o}F	Vacuum Conditions Inlet/Outlet: FV / -
Static Back Pressure: 0 PSIG	Built-up Back Pressure: **HOLD** PSIG
Vessel MAWP 150 PSIG	Normal Max Operating Pressure 135 PSIG
Service: ☒ Static ☐ Cyclic ☐ Pulsating	Installed Upstream of PSV: ☐ Yes ☒ No
Fluid: Heavy Water ☐ Gas ☒ Liquid	MW: 20.031 C_p/C_v: 1.32
Capacity Required: 66,979 lb/hr	Density: 69.2 lb/ft^3 Viscosity: 1.227 cP

ATTACHMENTS / ACCESSORIES

☒ Burst Disc Indicator: ☒ Closed circuit ☐ Open Contact ☐ Optical Class 1 Group B Div 2
☐ **Jack Screws** ☐ **Gauge Tap (¼" on inlet/outlet)** ☐ **Tell-tale Assembly**
☐ Pre-assembly Screws ☐ Baffle Plate ☐

MATERIALS OF CONSTRUCTION

Disc: 316L SS	**Holder:** 316L SS
Gaskets:	**Flanges:**
Seal (for Composite):	

DOCUMENTATION

	With Bids	Approval	Certified
Outline Dimensional Drawings	2		2
Operation & Performance Data	2		2

Literature & Parts List	2		2
Operating & Maintenance Instructions			2
Installation Instructions			2
Test & Inspection Reports			2
Material Certifications (CMTRs)			2
Code Certificate of Compliance			2
NOTES:			

RUPTURE DISC DATA SHEET

Tag No.: RD-9551 Ring Injection Beam Stop Loop Filter	M. **Quantity Required: ONE**

Applicable Code: ASME Code, Section VIII, Division 1

DISC	☐ **Forward Acting** ☐ **Scored**
	☒ **Reverse Acting** ☐ **Scored** ☐ **Knife Blade**
	☒ **Non-Fragmenting** ☐ **Sanitary** ☐ **Polymerizing Service** ☐ **Composite**
HOLDER	☐ **None** ☒ **Insert** ☐ **Bolted** ☐ **Threaded** ☐ **Union**
	☐ **Sanitary** ☐ **Flow Sweeps Disc**
	Line Size: ¾ **inches**

DESIGN CONDITIONS

Burst Pressure: 150 PSIG	Manufacturing Range: +0/-5%
Burst Temperature: 366 ^{o}F	Vacuum Conditions Inlet/Outlet: FV / -
Static Back Pressure: 0 PSIG	Built-up Back Pressure: **HOLD** PSIG
Vessel MAWP 150 PSIG	Normal Max Operating Pressure 135 PSIG
Service: ☒ Static ☐ Cyclic ☐ Pulsating	Installed Upstream of PSV: ☐ Yes ☒ No
Fluid: Water ☒ Gas ☐ Liquid	MW: 18.0152 C_p/C_v: 1.329
Capacity Required: 1,148 lb/hr	Density: 0.363 lb/ft^3 Viscosity: 0.0156 cP

ATTACHMENTS / ACCESSORIES

☒ Burst Disc Indicator: ☒ Closed circuit ☐ Open Contact ☐ Optical Class 1 Group B Div 2
☐ **Jack Screws** ☐ **Gauge Tap (¼" on inlet/outlet)** ☐ **Tell-tale Assembly**
☐ Pre-assembly Screws ☐ Baffle Plate ☐

MATERIALS OF CONSTRUCTION

Disc: 316L SS	**Holder:** 316L SS
Gaskets:	**Flanges:**
Seal (for Composite):	

DOCUMENTATION

	With Bids	Approval	Certified
Outline Dimensional Drawings	2		2
Operation & Performance Data	2		2

Literature & Parts List	2		2
Operating & Maintenance Instructions			2
Installation Instructions			2
Test & Inspection Reports			2
Material Certifications (CMTRs)			2
Code Certificate of Compliance			2
NOTES:			

RUPTURE DISC DATA SHEET

Tag No.: RD-9552 Ring Injection Beam Stop Loop Drain Tank	N. **Quantity Required: ONE**

Applicable Code: ASME Code, Section VIII, Division 1

DISC	☐ **Forward Acting** ☐ **Scored**
	☒ **Reverse Acting** ☐ **Scored** ☐ **Knife Blade**
	☒ **Non-Fragmenting** ☐ **Sanitary** ☐ **Polymerizing Service** ☐ **Composite**
HOLDER	☐ **None** ☒ **Insert** ☐ **Bolted** ☐ **Threaded** ☐ **Union**
	☐ **Sanitary** ☐ **Flow Sweeps Disc**
	Line Size: 3/4 inches

DESIGN CONDITIONS

Burst Pressure: 150 PSIG	Manufacturing Range: +0/-5%
Burst Temperature: 70 ^{o}F	Vacuum Conditions Inlet/Outlet: FV / -
Static Back Pressure: 0 PSIG	Built-up Back Pressure: **HOLD** PSIG
Vessel MAWP 150 PSIG	Normal Max Operating Pressure 135 PSIG
Service: ☒ Static ☐ Cyclic ☐ Pulsating	Installed Upstream of PSV: ☐ Yes ☒ No
Fluid: Water ☐ Gas ☒ Liquid	MW: 18.0152 C_p/C_v: 1.329
Capacity Required: 14,320 lb/hr	Density: 62.3 lb/ft^3 Viscosity: 0.976 cP

ATTACHMENTS / ACCESSORIES

☒ Burst Disc Indicator: ☒ Closed circuit ☐ Open Contact ☐ Optical Class 1 Group B Div 2
☐ **Jack Screws** ☐ **Gauge Tap (¼" on inlet/outlet)** ☐ **Tell-tale Assembly**
☐ Pre-assembly Screws ☐ Baffle Plate ☐

MATERIALS OF CONSTRUCTION

Disc: 316L SS	**Holder:** 316L SS
Gaskets:	**Flanges:**
Seal (for Composite):	

DOCUMENTATION

	With Bids	Approval	Certified
Outline Dimensional Drawings	2		2
Operation & Performance Data	2		2

Literature & Parts List	2		2
Operating & Maintenance Instructions			2
Installation Instructions			2
Test & Inspection Reports			2
Material Certifications (CMTRs)			2
Code Certificate of Compliance			2
NOTES:			

RUPTURE DISC DATA SHEET

Tag No.: RD-9553 Ring Injection Beam Stop Loop G/L Separator	0. **Quantity Required: ONE**

Applicable Code: ASME Code, Section VIII, Division 1

DISC	☐ **Forward Acting** ☐ **Scored**
	☒ **Reverse Acting** ☐ **Scored** ☐ **Knife Blade**
	☒ **Non-Fragmenting** ☐ **Sanitary** ☐ **Polymerizing Service** ☐ **Composite**
HOLDER	☐ **None** ☒ **Insert** ☐ **Bolted** ☐ **Threaded** ☐ **Union**
	☐ **Sanitary** ☐ **Flow Sweeps Disc**
	Line Size: 1 inches

DESIGN CONDITIONS

Burst Pressure: 150 PSIG	Manufacturing Range: +0/-5%
Burst Temperature: 120 ^{o}F	Vacuum Conditions Inlet/Outlet: FV / -
Static Back Pressure: 0 PSIG	Built-up Back Pressure: **HOLD** PSIG
Vessel MAWP 150 PSIG	Normal Max Operating Pressure 135 PSIG
Service: ☒ Static ☐ Cyclic ☐ Pulsating	Installed Upstream of PSV: ☐ Yes ☒ No
Fluid: Water ☐ Gas ☒ Liquid	MW: 18.0152 C_p/C_v: 1.329
Capacity Required: 24,422 lb/hr	Density: 61.7 lb/ft^3 Viscosity: 0.557 cP

ATTACHMENTS / ACCESSORIES

☒ Burst Disc Indicator: ☒ Closed circuit ☐ Open Contact ☐ Optical Class 1 Group B Div 2
☐ **Jack Screws** ☐ **Gauge Tap (¼" on inlet/outlet)** ☐ **Tell-tale Assembly**
☐ Pre-assembly Screws ☐ Baffle Plate ☐

MATERIALS OF CONSTRUCTION

Disc: 316L SS	**Holder:** 316L SS
Gaskets:	**Flanges:**
Seal (for Composite):	

DOCUMENTATION

	With Bids	Approval	Certified
Outline Dimensional Drawings	2		2
Operation & Performance Data	2		2

Literature & Parts List	2		2
Operating & Maintenance Instructions			2
Installation Instructions			2
Test & Inspection Reports			2
Material Certifications (CMTRs)			2
Code Certificate of Compliance			2
NOTES:			

DATA SHEET

DATA SHEET NO.	REV.	ISSUE DATE
106060000-DS-A004-R00	0	
PAGE 1 OF 1	REQUISITION NO.	
PROCURED BY	INSTALLED BY	

PROJECT TITLE	PROJECT NO.	CSO OR WO
Spallation Neutron Source		
JOB TITLE	BUILDING	PLANT
TARGET AND DUMP BUILDINGS		

EQUIPMENT: Check Valves

EQUIPMENT NO. SEE ATTACHMENT C

Suggested Model: Durabla Excalibur Series

TOTAL QUANTITY REQUIRED See Attachment C for equipment listing

PERFORMANCE:

Flowing medium Water
Style Center Guided Spring
Operating Pressure,psig 250
End Connections Butt Weld
Service Temperature Max 200 F
Internal Gasket Material Flexible Graphite
Seat Material Metal to Metal

ACCESSORIES:

Adjustable Spring resistance rate Yes

CONSTRUCTION:

Casing Material 316L SS PAINTING: N/A

A. NOTE: 1. Check Valve shall be manufactured of 316L SS as identified in specification section 15130

Furnish the following manufacturer's data in quantities indicated	NUMBER OF COPIES			Type of Data (Continued)	NUMBER OF COPIES		
	W' Bids	Approval	Certified		W' Bids	Approval	Cert
1 Outline Dimensional Drawings		2	2	6 Wiring Diagram			
2 Operation & Performance Data			2	7 Completed Data Sheet	2		
3 Literature & Parts List			2				
4 Operating & Maint. Instructions			2				
5 Installation Instructions			2				
PREPARED BY	APPROVED BY			PRINCIPAL ENGINEER	PROJECT ENGR. MANAGER		

NOTE:SPACE MARKED WITH AN ASTERISK(*) INDICATES BIDDER TO FURNISH THE INFORMATION

DATA SHEET

DATA SHEET NO.	REV.	ISSUE DATE
106060000-DS-A005-R00	0	
PAGE 1 OF 1	REQUISITION NO.	
PROCURED BY	INSTALLED BY	

PROJECT TITLE	PROJECT NO.	CSO OR WO
Spallation Neutron Source		
JOB TITLE	BUILDING	PLANT
TARGET AND RING BUILDINGS		

EQUIPMENT: Flexible Hoses

EQUIPMENT NO. (SEE ATTCHMENT C)

Suggested Model: American Boa M/N PARRAPP
TOTAL QUANTITY REQUIRED SEE ATTACHMENT C FOR EQUIPMENT LISTING
PERFORMANCE:

Flowing medium Water
Style Bellows with Braided outer Covering
Operating Pressure,psig 250
End Connections Butt Weld
Service Temperature Max 200 F

Size	OA Length	Dynamic Bend Radius (min)	Static Bend Radius (min)
1.5″	16″	10.0 inches	3.9 inches
2.0″	24″	11.5 inches	4.7 inches
3.0″	24″	15.35 inches	7.0 inches

ACCESSORIES:
Internal Bellows Liner No
CONSTRUCTION:

Bellows Material 316L SS Braid Material 316L SS
Butt Weld End Connections Material 316L SS

B. NOTE: 1. Flex Hose shall be manufactured of 316L SS as identified in specification section 15130

Furnish the following manufacturer's data in quantities indicated	NUMBER OF COPIES			Type of Data (Continued)	NUMBER OF COPIES		
	W' Bids	Approval	Certified		W' Bids	Approval	Cert
1 Outline Dimensional Drawings		2	2	6 Wiring Diagram			
2 Operation & Performance Data			2	7 Completed Data Sheet	2		
3 Literature & Parts List			2				
4 Operating & Maint. Instructions			2				
5 Installation Instructions			2				
PREPARED BY	APPROVED BY			PRINCIPAL ENGINEER	PROJECT ENGR. MANAGER		

NOTE:SPACE MARKED WITH AN ASTERISK(*) INDICATES BIDDER TO FURNISH THE INFORMATION

DATA SHEET

DATA SHEET NO.	REV.	ISSUE DATE
106060000-A003-R00	0	
PAGE 1 OF 1	REQUISITION NO.	
PROCURED BY	INSTALLED BY	

PROJECT TITLE	PROJECT NO.	CSO OR WO
Spallation Neutron Source		
JOB TITLE	BUILDING	PLANT
Ring Injection Dump Bldg		

EQUIPMENT: Globe Valves - Manual ¾" and smaller — EQUIPMENT NO. SEE ATTACHMENT C

Suggested Models: Swagelok SS-4BRW-TW, SS-4BMRW-TW, SS-BBG-TW

TOTAL QUANTITY REQUIRED SEE ATTACHMENT C FOR EQUIPMENT LISTING

PERFORMANCE:

Flowing medium Water
Cv (min) MFG Recommendations for models identified
Operating Pressure,psig 250
End Connections Butt Weld or Swagelok as identified
Service Temperature Max 200 F
Seal Material Bellows Seal 316L
Seat Material mfg standard for models identified
Flow Direction Under the Seat
Maximum Height, inches 4-3/16"

ACCESSORIES:

Bellows Seal Yes Bellows Material 316L SS
Operator Hand wheel or Knurled Metering knob

CONSTRUCTION:

Casing Material 316L SS
NOTE: 1. Valve shall be manufactured of 316L SS as identified in specification section 15130

Furnish the following manufacturer's data in quantities indicated	NUMBER OF COPIES			Type of Data (Continued)	NUMBER OF COPIES		
	W' Bids	Approval	Certified		W' Bids	Approval	Cert
1 Outline Dimensional Drawings		2	2	6 Wiring Diagram			
2 Operation & Performance Data			2	7 Completed Data Sheet	2		
3 Literature & Parts List			2				
4 Operating & Maint. Instructions			2				
5 Installation Instructions			2				
PREPARED BY	APPROVED BY			PRINCIPAL ENGINEER	PROJECT ENGR. MANAGER		

NOTE:SPACE MARKED WITH AN ASTERISK(*) INDICATES BIDDER TO FURNISH THE INFORMATION